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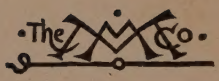

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Died in New York City, July 15, 1923.

A pioneer in the application of modern psychological principles to the problems of education, Dr. Colvin achieved marked success both as a teacher of teachers and as a writer of books for teachers. His *Learning Process* and his *Introduction to High School Teaching* are recognized as standard works in their respective fields. *Human Behavior*, the first edition of which was largely Dr. Colvin's work, has been used as an introductory text in educational psychology by more than a hundred thousand students. A former colleague and a former student have collaborated in the present revision which, they trust, may be regarded as a modest tribute to his memory.

STEPHEN SHELDON COLVIN

HUMAN BEHAVIOR

A FIRST BOOK IN PSYCHOLOGY FOR TEACHERS

BY

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PREFACE

The study of psychology has been looked upon for a long time as an essential phase of the professional education of the teacher. The following chapters represent an attempt to formulate psychological principles in terms of conduct or behavior. The authors believe that this "functional" point of view in psychology offers a helpful perspective upon the problems of classroom teaching, explaining many of the phenomena with which every teacher must deal, and which, unexplained, tend to irritate and confuse; and providing at least a few guiding principles that may be directly applied to the solution of troublesome problems in instruction and management.

It is hoped that the book may prove useful to the large numbers of young men and young women who each year enter the service of the public schools. It has, indeed, been written with a distinct recognition of the immaturity and inexperience which these beginning teachers represent. Every effort has been made (1) to select the topics that are most closely related to the work of teaching; (2) to treat these topics concretely, enforcing each principle with a wealth of illustration drawn partly from classroom practice, and partly from the affairs of everyday life; and (3) to simplify the terminology, without, at the same time, sacrificing accuracy of statement.

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The materials have been organized somewhat upon the "spiral" plan. The first chapter embodies a concrete case of human behavior, described in nontechnical language, and illustrating the various factors that condition behavior and control conduct both in customary and in unusual situations. Thus an initial "bird's-eye" view of the treatment is given at the outset. The next few chapters are also general in their nature, treating upon a simpler and more primitive plane the topics that are later analyzed more minutely. This plan of organization obviously involves a certain amount of repetition; but the repetition, it is believed, will serve a useful purpose in impressing upon the student the fundamental fact that the higher and more complicated forms of behavior have grown out of the simpler forms, and involve these simpler forms as indispensable elements.

The authors have emphasized certain phases of psychology that are usually treated very briefly in textbooks of general psychology. Among these are habit, feeling and emotion, memory, and the economical methods of learning. The treatment of sensation, perception, and imagination is much briefer than in many other texts, and the discussion of the anatomy and physiology of the nervous system has been limited to the facts of structure and function that are essential to an understanding of the mechanical modes of behavior.

It is believed that the summary at the end of each chapter will serve to emphasize the important points to be fixed in the mind and to aid the student in organizing the facts and principles.

The "Questions and Exercises" appended to each chapter have been constructed chiefly for the purpose of encouraging the student to study behavior in the concrete, and especially to observe the factors that operate in determining his own conduct. The questions should be used in such a way that the student may *examine his own experience* in order that he may find there the facts with which psychology is concerned. The student, therefore, should not be expected to answer all of them in conventional psychological terms. As the treatment proceeds and his conceptions become clarified, his language should become more exact and his descriptions more nearly accurate.

The authors further desire to express their thanks to Professors H. S. Jennings, W. B. Pillsbury, and J. R. Angell, to Dr. L. F. Barker, and to Henry Holt and Company for permission to use various illustrations accompanying the text.

S. S. C.
W. C. B.

PREFATORY NOTE TO THE REVISED EDITION

This book was first published in 1913, and met with a gratifying reception from teachers of beginning classes in psychology in professional schools for teachers. Just prior to his untimely death in 1923, Dr. Colvin was planning with the junior author a thoroughgoing revision of the text. After five years this revised edition appears, following as far as possible Dr. Colvin's suggestions for changes.

Every effort has been made to retain the qualities of the first edition which made the book acceptable and for which Dr. Colvin was chiefly responsible. The earlier chapters have been modified only insofar as has been found necessary to bring them into harmony with the results of investigations reported since the first edition was published. The concluding chapters, however, are very largely new material, except that Dr. Colvin's articles on the nature and measurement of intelligence (a field to which he was among the first of the psychologists to make notable contributions) have been liberally drawn upon.

Brief biographical notes concerning outstanding workers in the fields of psychology, mental measurements, and educational measurements have been included in the revised edition. The names have been

selected objectively on the basis of frequency of reference in twenty-three widely used textbooks.

In preparing the revised edition the junior author has been fortunate in having the sympathetic and helpful coöperation of Miss Marion E. Macdonald, a former student of Dr. Colvin's, and for some time his assistant.

WILLIAM C. BAGLEY

New York City
August, 1928

TABLE OF CONTENTS

CHAPTER		PAGE
I.	Consciousness and Conduct	1
II.	Behavior and Learning	20
III.	Spontaneous Behavior	30
IV.	Attention, Interest, and Effort as Related to Behavior	43
V.	Behavior and the Feelings	61
VI.	The Nervous System as the Organ of Behavior	81
VII.	Native Tendencies and Behavior	99
VIII.	Habitual Behavior and the Law of Habit Building	124
IX.	Perception and Imagination in Relation to Behavior	140
X.	Memory and Behavior	167
XI.	Economy and Transfer in Learning	184
XII.	Behavior as Related to Meaning and to Thought	203
XIII.	Measurement and Behavior	228
XIV.	Individual Differences: Intelligence	250
XV.	The Efficiency of Behavior	276
XVI.	Character and Behavior	292
	Index	323

we say that a person loses consciousness, we all know what is meant — for we all lose consciousness when we fall into a sound sleep. When we awake we "return to consciousness," we "become conscious" of some of the things about us. Yet even when we are awake, we are "unconscious" of some of the things about us. These are not "in mind."

The service of consciousness in controlling action. We are all conscious to a greater or less extent during our waking life, and we may well ask, "Of what *use* is this consciousness; what *good* does it do us; what *service* does it render?" This is the question with which we shall be chiefly concerned in this book, for while we shall try to find what consciousness is and how it acts, we shall further inquire, "What value has it in our lives?" We might live — after a fashion — without consciousness. In deep sleep it does not appear to be a necessity. The heart still beats, we still breathe, and we sometimes make slight movements. With the first sign of returning consciousness, however, we make definite movements of some sort, and when we are wide awake, our movements become more varied and more definite. It is clear that *definite movement and consciousness are closely related,* and we may say here at the outset that *consciousness operates primarily to direct our movements and control our behavior in the light of our past experience.*

We may get a clearer notion of what consciousness is and what value it has in directing our acts by taking a concrete illustration of a typical set of conscious states, or "consciousnesses," as they follow one another in a series of experiences.

Illustration of a typical set of conscious activities. During a summer's vacation, I took a day's sailing trip with a companion down Narragansett Bay to Newport. Because of a continuous headwind, we arrived late in the afternoon, and were forced to make the return trip to Providence after sunset. Soon darkness overtook us, but with a brisk breeze blowing and with a full moon shining from a cloudless sky, this fact gave us little concern. However, although we were quite familiar with the bay as it looked in daylight, it was not so easy a matter to steer our course at night, guided only by the various lights which dotted the shore or marked some dangerous reef or shoal. And so it happened that we " picked up " the wrong light and left our course, sailing in close to a ledge of rocks, which, with their jagged teeth, projected at the half-tide just a few feet above the surface of the tumbling and surging sea.

I was at the helm of the small catboat, which was sailing easily, the breeze filling her bellying sail. Clear consciousness was at a low ebb. I " sensed " the tug of the wind and the pressure of the tiller and drank in the beauties of the August evening — the glistening of the waves in the glorious moonlight, the dancing of the lights on the shore, the toll of a near-by bell buoy, and the weird cries of sea birds. It all might have been an exquisite dream, as the moments glided by and as under the splendor of the sky and on the shining sea the small craft rose and fell with steady monotonous motion.

But suddenly all this is changed! Just over the bow appears a dark object, lying low and extending many feet on either side. In a moment the beauties of the night are lost from consciousness, and there stands out

in the mind one insistent question — "What is it? Perhaps a fisherman's net? No, it looks too bulky for that. Then a watch boat of the oystermen?" Rapidly various possibilities come into mind, and then as the boat sails nearer there is an end to this silent debate. The waves are seen foaming white as they break upon the reef, for this it is that stands in our course. Now we are almost on the rocks, and quickly the attention is fixed on the boat, as mechanically I tug at the sheet and jam the tiller hard over, in a fruitless attempt to pass to the windward of the peril. No, this cannot be done; we cannot sail around the rocks, and soon we shall be thumping on them! There is another moment of rapid debate. Shall I take the boat hook and run to the bow and try to ward the boat off the reef? No, we are sailing too rapidly for that. There is just one chance left of saving ourselves from wreck; it is to check the speed of the boat by letting the sail run out, so that the breeze will not fill it, at the same time trusting to the wind to blow us away from the reef. In a flash these possibilities run through my mind. Then out goes the sail until it flaps in the wind, the boat loses head, but there is scarcely an inch to spare as her bow drifts away from the reef and she passes out of danger.

Some important facts about consciousness. (*a*) *It constantly changes in terms of purpose.* In this example of an actual situation we find on examination a very complex set of conscious states, that well illustrate the problems with which this book is to deal. It will, therefore, be worth our while carefully to analyze the elements and find what they show in regard to the

nature of consciousness and the way in which it aids us to direct our actions. As far as the nature of consciousness is concerned, we may observe in the first place that it is in a state of continual fluctuation and change. Yet, in spite of this fact, it is always moving on in a more or less definite direction. It is going somewhere. These changes and shifts in our consciousness mark various phases of attention, as it turns now to one aspect of experience and now to another. The moving on of consciousness in a more or less definite direction indicates the general aim or end of the whole thought process. We invariably "think about" *something*, and it is this something which we have clearly or vaguely in mind that decides in just what direction our thoughts shall move.

In the example just cited, the consciousness of those in the boat moves in the direction that the purpose of the trip and the interests centered around it suggest. It is not anything or everything that comes into consciousness. The parts that compose it at any one moment have a definite relation to the total thought. Nothing comes in a haphazard fashion. Into my mind at one moment come the lights on the shore, for by them I am steering, and my main purpose is to sail the boat safely to its mooring. Or again I listen to the sound of the bell buoy, for that too has a significance in relation to the sailing of the boat. So, also, objects on the water catch my attention and hold it, because they have a meaning. I notice the red light of a passing motor boat and fix it in attention sufficiently to alter my course so that there will be no danger of a collision. And since my general purpose is not merely sailing the

boat, but getting my fill of enjoyment out of the day's outing as well, there also come into my mind many things that have but little to do with the actual sailing of the boat. So I drink in the beauties of the evening and enjoy to the fullest extent the exhilaration of the surroundings.

(*b*) *Interest and attention determine these changes.* Thus my *interests* and my *attention* determine the elements that enter into my consciousness, the manner in which they work together, and the course that they take. Further, as has been said, the attention varies with each succeeding change and fixes the character of these changes. I am now looking at the lights on the shore; now I recognize the cry of the sea bird; again I feel the dash of the spray in my face and now the tug of the tiller. There are brief periods of relative inattention between these shifts from one aspect of the scene before me to another. Here the mental processes " let up " for a moment, so to speak, before they grasp another phase of the experience.

It may be seen from this brief discussion that attention is an accompaniment of all states of consciousness. Without this onflowing of consciousness and its fluctuation from moment to moment, there would be no mental life, at least as we know it. We shall later discuss in a separate chapter the nature of attention and the laws that govern its manifestations. Suffice it to say for the present that interest and attention are invariable characteristics of mental life.

(*c*) *Feeling is essential to consciousness.* My total consciousness is characterized not only by states of attention; equally fundamental to it is feeling. By

feeling the psychologist understands those states that we can speak of as pleasant or unpleasant, as well as more complex states that are called emotions. We not only recognize the existence of an object; we attach some *value* to it. It *means* something to us. We *like* it or *dislike* it; we *dread* it, or *rejoice* in its presence; and so on. I am not only conscious of the splendor of the evening, I am *thrilled* by it; I not only sense the pressure of the tiller against my thigh, but I *enjoy* the sensation with the impression that it gives me of my own strength and skill in steering the boat through the rough seas. I do not merely see the rocks ahead, but I have an emotional state in reference to them. They cannot be a matter of mere intellectual indifference to me, for they make a difference in the situation. They are objects to be *dreaded*. And so it is with the whole series of conscious states. None is totally indifferent; all have more or less " feeling " attached to them, just as they are characterized by a greater or less intensity of attention. Feeling, then, like attention, is an unvarying accompaniment of all consciousness of any degree of complexity. It, too, will be discussed in a subsequent chapter.

(*d*) *Consciousness may be at a low ebb when acts are habitual, reflexive, or the result of instinctive tendencies.* If I consider once more the experience above outlined, I cannot fail to notice that certain aspects of it are more vividly conscious than are others. For example, I am definitely and painfully aware of the presence of the dangerous reef. It stands out in the clearest way; but the pressure of the tiller barely enters the state of clear consciousness at all. Notwithstanding this fact,

I steer the boat without difficulty, for through many years of experience I have succeeded in doing this with very little thought. Indeed, I can thoroughly enjoy the beauties of the evening and attend to the sights and sounds about me, even listening to the conversation of my companion, without letting the boat "fall off." I hold her to her course, because steering has become for me a matter of *habit*. At first it required all my attention, because I did not know how; but when we finally "learn how" we require little or no consciousness to carry on those activities in which we are skilled. *Habit is basal to all learning and weaves itself into all our acts*. Its nature and importance are to be subsequently discussed.

There are many acts, however, which are for the most part, or wholly, unconscious and which, nevertheless, are not matters of habit. For example, if I had examined the size of the pupil of my eye before nightfall and then again after darkness had set in, I should have found that it was considerably smaller in the daylight than in the night. The reason for this is to be found in the structure of the eye itself and the nervous mechanism that controls it. The change that here takes place is termed in psychology a *reflex activity*. It differs from habitual activity, as will later be pointed out, in that it is inborn and not learned through experience.

When these reflex acts cease to be simple, they are said to be the expression of *instinctive tendencies*, especially if they are joined with a considerable element of feeling. For example, when I first recognized the dangerous shoal, I felt a shrinking and a tendency to

let go of the tiller, clamber over the stern of the boat, and seek safety in the skiff we had in tow. This was due to the tendency of all living organisms to shrink away from a dangerous object. This is probably inborn; we may learn to control it, but we seem never entirely to get rid of it. The tendency to get away from danger stampedes herds of cattle, puts armies of valiant men to utter rout, and turns into a disorganized and brutal mob the passengers on the deck of a sinking vessel. Like reflex action and habit, the influence of the inborn tendencies upon behavior is fundamentally important.

(*e*) *Sensation, meaning, and perception are basal to consciousness.* It can be easily seen on analyzing consciousness that at its basis there is always to be found what we call a *sensory* experience. My eyes beheld the splendor of the evening; my ears received the sounds that came from land and sea; I tasted and smelt the salt spray and my skin sensed its coldness. My hand touched the tiller and my thigh received its pressure. As I steered the boat, I was conscious of the contraction of my muscles and the movements of my wrist and elbow joints. This consciousness helped me to give the right motion to the tiller. I did not need to look at it in order to tell how to steer the boat, for these sensations of movement gave me the cue. Further, when I became conscious of the dangerous rocks, there was a sensation of " sinking " in the pit of my stomach, which was a part of my experience of dread.

Into my consciousness, then, there came, from time to time, *sensations* of sight, of hearing, of taste and of smell, of pressure and warmth and cold. There were

sensations, too, from the muscles, joints, and tendons, as well as from the internal organs. From these examples it can be seen that *interwoven in all our experiences and essential to them is sensation, and if we were incapable of sensation we should have no experiences whatsoever.* But sensation would be a worthless thing as mere sensation. It must be interpreted to be of use. This interpretation is known as *meaning.* Sensation, with meaning attached, is called *perception.* It is to be found in all states of consciousness of any degree of complexity and must be considered in a following chapter.

(*f*) *Imagination a phase of consciousness.* In the consciousness of the moment there is always much that does not belong to the moment. When to-day I recall the events of the August evening previously described, I do not have them actually before me; they exist only in my *imagination.* So, too, when I saw the reef ahead of the boat, I experienced the emotion of terror because I *imagined* what would happen if the boat kept on her course. I saw in my mind's eye the boat beating on the sharp rocks, I heard the crunching of her keel and felt the list, as in imagination I slipped on the deck. I even seemed to experience in advance the chill of the water as the boat capsized and we were plunged into the sea. Indeed, the situation would have lost a large part of its meaning had it not been for the " images " drawn from the past and projected into the future. Imagination, then, is fundamental to all experiences that go beyond the present moment, and must therefore be given careful and ample consideration in our subsequent discussion.

(*g*) *Memory and association phases of consciousness.* When I recall past experiences, as, for example, when I try to picture how the bay has looked on some previous occasion, I am not only reviving images that belong to the past; I am giving them a particular setting in relation to a definite past experience. This recall is known as *memory*. In connection with any experience, I tend to recall previous experiences of a similar nature, or experiences in some way connected with the present. As I hear the toll of the bell buoy my mind goes back to an earlier trip along the same course, when I had noticed the doleful sound particularly, and spoke about it. Then there comes to mind a distinct recollection of this earlier trip, and many details of it are revived by the associations called up by the sound of the bell. Thus the present experience is united to the past by innumerable bonds. This ability to call up the past through *association* gives the present its meaning, for without memory there would be no background to the experiences of the moment. Later we shall consider what memory is and by what means associations are formed.

(*h*) *Conception, judgment, and reasoning, important aspects of consciousness.* When I first saw the reef, a doubt came into my mind as to what it was. When I finally recognized it, there passed through my mind the thought, "This is a reef of rocks." I do not mean that I actually gave expression to this thought. Events moved so rapidly that there was no time for words. However, the idea contained in these words came into consciousness. Such a state of consciousness is called a *judgment* and the thought "rock" a *concept*. Judg-

ment and conception may be considered economical ways by which the consciousness of the present moment comprehends something more or less new. In a judgment I recognize the immediate experience as having points of similarity with past experiences. Hence I am not obliged to treat what is now occurring for the first time as if it were a completely novel experience. If I were obliged so to treat it, I should not know how to behave. I should be compelled to act without foresight and without a plan. But when I recognize that the dark mass before me is an object that belongs to a certain *class* of objects called reefs, I know how to act, because although I know nothing about this *particular* reef, I do know what reefs are *in general.* It is for this reason that I understand that the particular reef is a menace and that I must act quickly to escape from danger. My behavior in this new situation is directed by my knowledge gained from other experiences that have points of similarity with the present. Thus it can be seen that conception and judgment are most important activities of consciousness in a situation that calls for intelligent action. Without them, we could perform only the simplest and most habitual acts.

When I finally realize that the object in the course of the boat is a reef, then there comes to my mind the question, " How shall I escape from the difficulty? " Rapidly I consider possibilities and accept or reject them, as they seem practical or the opposite. Shall I attempt to sail around the rocks, or shall I let the boat drift, in the hope that I may be carried away from the rocks by the wind and tide? What are the relative possibilities of success in either case? Finally, I select

one mode of action and follow it, but I do not act blindly. I *reason* out what is best to do. This places me at a tremendous advantage over the person who cannot reason, for he is helpless. He cannot see ahead and must trust to blind chance to get him out of his difficulty. So important are these so-called higher mental processes of conception, judgment, and reasoning that no discussion of human behavior can ignore them.

Relation between consciousness and behavior. This latter consideration brings us at once to our chief question in regard to consciousness, namely, " What is its use? What service does it render? " We suggested at the outset that consciousness helps by guiding our movements and directing our behavior in the light of our experience. The word " behavior " is used by psychology as equivalent to movement. This is a characteristic of all animal life from the lowest to the highest. In the most simple organisms there is but a slight range of action, and the consciousness accompanying such action is likewise doubtless slight, if indeed it exists at all. With the higher animals, however, the behavior is more complicated, and there are innumerable possibilities of different sorts of behavior. It seems certain that as behavior becomes more complex and more difficult to regulate, consciousness likewise increases in complexity. *It is, therefore, reasonable to assume that consciousness puts in an appearance when it is required to aid behavior. The service that consciousness renders is to adjust the organism better to its surroundings. When there is perfect adjustment there is no need of consciousness; when, however, the organism is not so adjusted, then consciousness is necessary in securing a better adjustment.*

Consciousness at its maximum in a thought crisis. Now, what is true of animal life in general is likewise true of the individual. Consciousness is not equally present at all times. We know that some acts are performed entirely without the direction of consciousness, while others require the fullest knowledge for their execution. If we turn again to a consideration of the situation that we discussed at the beginning of the chapter, we can see at once that this is the case. In sailing the boat, many of the acts that I performed were done with little or no thought. It required slight attention to steer the boat, because I had learned to do this by long years of practice. I had acquired habits. Again, when I saw the rocks ahead I had an *urge* to escape from the boat. This came without any thought on my part, since it is instinctive to avoid danger. If all of my acts were of this simple character, I should need little consciousness. However, when the question arose of how to get out of the difficulty that confronted me, then there was need of the highest grade of consciousness. I could not then rely on instinct or habit. I was obliged to attend, judge, reason. When the situation became difficult, consciousness became very clear. *In those moments of our life, then, when we are in real difficulties, when we face new and pressing situations, then in a large measure our activity is no longer guided by instinctive tendencies and habit, and consciousness reaches its maximum of clearness and intensity.* Attention is marked, and the thought processes are called into play. We have in a situation of this character what may be termed a " thought crisis." When a thought crisis arises, there is always a *problem* to be

worked out, a *situation* to be faced, a *difficulty* to be surmounted. If our lives could go on in dull, unvarying routine, we should need little conscious direction. We should pass a sort of slumber existence, our behavior being conducted on the plane of instinct and habit. Some persons undoubtedly live at this level of consciousness a large part of the time; all of us do some of the time.

The problem of psychology. Throughout the following discussion we shall hold to the point of view that consciousness is practical, *i.e.*, that it directs conduct, that it makes possible a more satisfactory type of behavior than could exist without conscious control. Whenever behavior is at all varied and complicated, we shall take this as an indication that consciousness accompanies it. However, we shall consider not merely those modes of behavior that are connected with the higher forms of intelligence, but also those that exist with low grades of consciousness, and even those in which consciousness is probably lacking, for from these the more complicated forms of behavior are developed and with them those mental states that direct and control them. Thus it can be seen that *the problem of psychology is not simply the analysis and description of consciousness and of the laws that govern it, but also an inquiry into the relation of consciousness to behavior and the interpretation of consciousness from the standpoint of behavior.*

Summary. Psychology is concerned with consciousness and its function as a director of behavior. Up to this point we have considered the nature of consciousness through the analysis of a complex mental state.

We have seen that consciousness is always moving onward and is invariably characterized by some degree of attention and tinged with states of feeling and emotion. We have further seen that all mental states have at their basis sensations, which, when interpreted in the light of past experience, become perceptions. Sensory experience when not actually present may be called back in imagination, which reflects the past and points ahead to the future. Past experiences when definitely recalled become memories. Such recall is made possible through associations, by means of which the present is joined to the past by countless links. Sensation, perception, imagination, and memory and association are the chief manifestations of mind in its more simple forms. These, however, are not adequate to deal with more difficult situations in which conception, judgment, and reason are needed. These "higher" forms of mental life enable the individual to act in a present situation with a clear understanding of its relation to his past experience and its bearing on the future.

Consciousness, then, enables the organism to adjust itself better to its environment. The more complex the behavior, the more complex the conscious processes become. Consciousness reaches its maximum of clearness and intensity during a thought crisis.

Definitions and Explanations of Terms Used

Organism. A term used in biology to represent any living animal or plant.

Adjustment. The response of the organism to a situation that confronts it. Adjustment may be rela-

tively perfect or imperfect. In the former case it requires little or no conscious direction, but in the latter case consciousness must aid in securing a more satisfactory adjustment.

Behavior. All activities of animal forms from the amœba to man, including the simplest movements like contraction, breathing, the winking of the eye, and the most complex activities like organizing an industry, composing an address, or painting a picture.

Consciousness cannot be logically defined, but merely described and its states enumerated. It is the sum total of mental states, such as sensing, perceiving, imagining, recalling, judging, willing. When present, it may direct or control behavior.

Experience is a term used to denote the entire conscious life of the individual. Experience in general signifies the totality of consciousness in all organisms capable of it.

Purpose is the aim or end toward which behavior is directed. My present purpose, for example, is the interest that dominates me, the problem I have in mind. My mental states arise, assemble themselves, and move on in terms of this purpose.

Situation. That which confronts an individual, requiring an adjustment. Situations increase in definiteness when difficulties arise. A situation of any degree of complexity requires thought. It exists merely as a possibility when it can be met in an instinctive or habitual manner.

(Instinctive tendencies, habit, attention, affection, emotion, sensation, perception, imagination, memory, conception, judgment, and reason, which have been

briefly discussed in the present chapter, will each be more accurately defined in the chapters that follow.)

QUESTIONS AND EXERCISES

1. What is necessary in order to make a body of facts and laws a science? Name several sciences and state the kind of facts and laws with which each is concerned.

2. What word may be used as equivalent to the word "mind"? State some facts that you knew about mind before you read this chapter. State some facts about mind that you have learned from this chapter.

3. State some important differences between our waking life and our sleeping life.

4. Find in your experience of to-day some cases in which your consciousness has directed or controlled your action. Can you find any instances of action or behavior that have not been directed by your consciousness?

5. What is meant by the statement that consciousness is always moving in a more or less definite direction? Examine your own consciousness just after you have solved a problem in arithmetic or algebra. What came into consciousness while you were solving the problem? What things can you detect afterward that you were not fully conscious of then?

6. Contrast the feeling or the affective consciousness when you are playing a game that you thoroughly enjoy with the feeling or affective consciousness that you have when you are doing a disagreeable task.

7. Can you find any part of your daily experience that is indifferent from the point of view of feeling — something that you neither like nor dislike?

8. What is meant by a "sensory experience"? Name some of the sensory experiences that you have in walking to school; in studying a lesson; in writing; in eating a meal; in playing a game.

9. Find an illustration of "perception" in your present consciousness. What part does sensory experience play in the perception? What is there in the perception besides the immediate

sensory experience? You might have the same sensory experiences when you look at a book as a little child or a savage would have in looking at the same book. What would be the difference between your perception and his perception?

10. What is meant by "imagination"? Try to imagine clearly some house that you pass on your way to school. How many windows has it on the side that faces the street? If there is a porch or a piazza, how many pillars support its roof? How many steps lead up to it? When you pass the house again, note how trustworthy your imagination was in these and other details.

11. Look at some object in the room and let it suggest some definite past experience. What "memories" are revived in your consciousness? What is this connection between a present experience and past experiences called?

12. When I first saw the reef, I did not recognize it as a reef; the light was dim, and I could not make it out. When, after some hesitation and careful inspection, we finally "make out" what a group of sensory experiences mean, what do we call the process? Can you find an example of this in your own daily experience?

13. What do you mean by the term "behavior"? Give some examples of behavior in animals like the dog or the horse; in insects like the ants and bees. In what ways does the behavior of very young children differ from that of adults? Give an illustration of instinct.

14. What is meant by a "thought crisis"? Can you find an example in your daily life? If so, describe as accurately as possible your consciousness at the time.

15. In going over the experiences of a day, do you find relatively many thought crises, or does your life flow on for the most part in such a way that you do not need to think definitely about what you are to do next?

CHAPTER II

BEHAVIOR AND LEARNING

New situations make learning necessary. At the close of the preceding chapter we emphasized the fact that consciousness exists in order that the organism possessing it may adapt itself better to its environment. In other words, consciousness meets a need, and the chief problem of psychology is to show how consciousness meets this need — how it helps the animal to act more or less successfully. Let us remember, also, that this need would not exist if the conditions of life were unchanging. It is because conditions vary from time to time that new kinds of behavior are demanded. These conditions, although changed, are not absolutely new, and they require behavior that is only in part different from former behavior. The fact that they are *different* and yet in some respects similar, makes learning possible. If there were no change, if the surroundings were always constant, if the situations were forever the same, there would be no necessity of learning after the first responses had been mastered. On the other hand, if the conditions of each succeeding situation were absolutely new, then learning would be impossible, for nothing gained in a past situation could be employed in one that followed, since the two would be totally dissimilar.

Consciousness and learning rest largely on the same

necessary conditions, and what makes possible the one also makes possible the other. Indeed, so closely are they connected that ability to learn has been taken as the chief evidence of the existence of mind; when such ability is absent, mind has usually been considered absent.

Learning signifies the modification of the behavior of an organism in the light of experience. The behavior of an organism may fit well a certain situation until the situation is changed in some important detail. Then the customary actions are no longer suitable, and the organism must change its actions to meet the new conditions. When this has been done, something has been *learned.* It can be seen that it is exactly under these conditions that consciousness puts in its appearance, for here is a new situation and here a " thought crisis " is certain to appear.

An example of learning in its most simple form is found in the actions of a perch when placed in a tank with a number of minnows. The perch darts after the minnows and devours them according to a deep-seated inborn tendency. After a time, a glass slide is placed in the tank so as to separate it into two parts. On one side of this invisible partition is placed the perch and on the other side, the minnows. The perch darts at its prey as before, but strikes its nose against the glass. It tries this again and again, with the same unpleasant results. After a while, however, it so modifies its behavior that even in extreme hunger it remains quiet on its own side of the partition, for it has learned that the earlier actions result unpleasantly. This experience has so modified its conduct that even when the glass partition is removed, it remains motionless, while the minnows swim in safety near by. If, however, the perch had continued to dash at the minnows, in no way changing its actions in face of the new situation, we should have considered learning under such conditions impossible.

Modification of behavior. (*a*) *Through trial and error.* Behavior may be changed or modified through experience in several ways. The simplest and most general of these is by " trial and error," or " trial and success " as it is sometimes called. The individual attempts to do one thing and does not succeed, then he tries another and perhaps another, so continuing until the proper act is hit on to bring about the desired result. Trial and error may be a quite hit-and-miss process, as it invariably is with lower animals and often is with man. It may, however, be directed in some measure by conscious purpose, as when a person goes about by trial to find out which one of several possible modes of action which he has pictured to himself will work best.

An example of trial and error of the former sort, where the action is simply a blind groping, is found in the "maze experiment" in

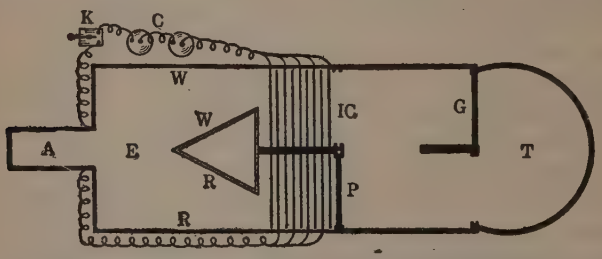

Fig. 1. Simple labyrinth used by Yerkes in experiments with frogs. A, box leading into maze at entrance E; W, W, white cardboard; R, R, red cardboard; P, partition; G, glass plate; T, tank; C, K, cells and key for electric circuit IC whereby animal received shock on entering wrong passage. (From Washburn, *The Animal Mind*, Fig. 14.)

animal psychology. The animal is placed at the entrance of a specially constructed maze, at the center of which is food. The animal, urged on by hunger, attempts to secure the food, moving about in an aimless manner, encountering here a blind alley and there another, until after many failures it finally reaches the center

and secures the food. If this test is tried day after day, the animal will sooner or later learn the direct way to the center and secure the food without difficulty.

This purely chance method of learning is not infrequently used by human beings as well as by lower animals. If a person is given a complicated puzzle to solve, he sometimes employs one method and then another, continuing in a quite haphazard way until by chance he hits upon the right one. However, he may restrict his range of trial by studying the various possibilities and then finding which will work. An example of trial and error of this latter sort may be found by turning again to the situation described in the first chapter. When I discovered that the boat was sailing directly for the reef, several possibilities occurred as to how best to get out of the difficulty. One plan was to head the boat up and sail around the rocks to the windward; another was to let go the "sheet" and try to drift out of danger; and still a third, if these did not work, was to run to the bow and attempt to hold the craft off from the reef with a boat hook. The first of these attempts failed, while the second fortunately succeeded. This restriction of the trial-and-error process was made possible because of conscious direction of acts called out by the situation. If a person who knew little about the sailing of a boat had been at the helm, he would have tried blindly, and with no plan, to escape from the danger. Probably he would have made, almost unintentionally, a number of random movements. If one of these succeeded, it would have been solely by a lucky chance, but the person would doubtless remember the successful movement and adopt it if he confronted a similar situation again.

From the above discussion it is clear that *the process of learning by blind trial and error is tremendously wasteful. It must be limited and controlled wherever possible by conscious direction.* The adult must do this for himself, but for the child a large part of this direction must come from parents and teachers. If the child at school and in the home were permitted to act merely according to his own interests, or according to the necessities arising from his immediate surroundings, he would doubt-

less stumble on many things of advantage and would learn many satisfactory modes of behavior. This, however, would take a long time, and there would be many mistakes, some of them perhaps serious. Simply because the race has learned largely in this way, it does not follow that each individual should laboriously plod the same path. There will be some trial and error in all learning, but it is the business of the parent and the teacher to reduce this by pointing out to the child proper methods of procedure, thus relieving him from the necessity of making many failures in learning when only a few are necessary. It must be remembered, on the other hand, that we all learn by doing, and there will always be a place in the school, as well as in the world at large, for the individual to find for himself just how things work.

(*b*) *Through forming "free ideas."* The higher form of learning is found in *consciously* bringing the past experience to bear on the present. The individual learns how to conduct himself in a given situation. Later a new situation is presented that has elements similar to the earlier situation, and knowingly he uses the experience gained in the former situation to aid him in solving the new. He has taken certain "ideas of procedure" gained through one experience and intelligently applied these to the novel conditions insofar as they will fit. When we say that he has an "idea of procedure," we mean that he consciously "knows how" certain things are done. He does not need to begin entirely anew; what he has before done comes to his aid, although the situation is not the same. This ability consciously to apply elements of a past experi-

ence to a situation that differs in essential details from those met earlier has been termed by psychologists the power of forming "free ideas." The term "free" indicates that the idea in question has been detached from the situation in which it first arose and can be used under other conditions. This type of behavior is also described as "intelligent," and when we characterize an act as intelligent we usually mean that it has been governed by a conscious control of free ideas.

It has been held by some psychologists that animals lower than man are incapable of forming such ideas. A dog is confined in a "puzzle box." He is tired of confinement, and he is hungry. Food

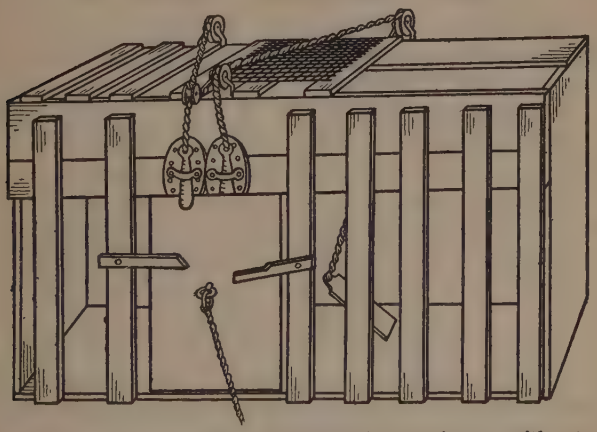

Fig. 2. Puzzle box used by Thorndike in experiments with cats. (From Washburn, *The Animal Mind*, Fig. 17.)

is placed just outside, and he eagerly sniffs it. Then he tries to escape from the box to satisfy his hunger, but to do this he must reach his paw out between the bars and raise the latch. He makes all sorts of aimless pawings in his efforts to escape, and after a long series of trials and failures at last hits upon the right combination and gets out. His reward is the food. Again he is placed in the

box under identical conditions, and again he tries to get out. Perhaps this time he does better because of his previous experience. At any rate, sooner or later he learns to escape from his confinement in a few seconds, effecting his release with no difficulty. Now the combination on the box is changed. The door of the box is fastened by a button. The animal is "all at sea." He must begin again, and master the situation anew, and he does this in the same aimless way as before, for he has not been able to "abstract" any idea of procedure from his previous experience to apply to the new problem that he must work out.

If a human being were placed in a similar position, he would probably proceed in a different manner in the face of the changed situation. He has learned, let us assume, to pick a complicated lock. Perhaps in the first instance he went about the task in a quite aimless way; like the animal, he may have finally succeeded purely by a lucky stroke. However, as he becomes more adept in the manipulation of this particular lock, he gradually acquires the notion of how it is done. This notion or idea he can recall to consciousness at a later time. Hence, when he is given another lock of a somewhat different make, he sits down and studies it out in the light of his earlier experience. In this way he greatly shortens the time of picking the second lock. As he has wider and wider experience with locks, he gains greater facility in opening them. The most complicated safety locks are now no longer a mystery, and he may even be able to open the bank safe, the combination to which has been lost. On the other hand, the dog might be "tried out" with all sorts of puzzle boxes and still never get an "idea of procedure" that would apply to such boxes in general. In other words, it is very doubtful whether a dog can take the essential method out of its original setting, and hold it in consciousness as a "free idea."

Let us suppose for the moment that in the danger confronting the boat as it sailed toward the reef, we had been unable intelligently to apply past experience to the immediate situation — that we had never been in the difficulty that now confronted us. It had many new features. However, we had handled boats, and

knew of certain possibilities of action. These were *general ideas* that we had gained from many different experiences, and rapidly and *consciously* we recalled these ideas to consciousness in the effort to escape from the pressing danger. There was little time for simple trial and error. A mistake might prove fatal. We were obliged to " think," and we could do this only in terms of general ideas gained from past experience. It was lucky that some of these at least had been freed from the particular situations in which they had arisen and were now at our service in the emergency that confronted us.

Trial and error can be reduced but not eliminated. What has just been said emphasizes the importance of learning by gaining general notions or ideas of procedure. While there will never come a time when the process of trial and error can be entirely eliminated from our behavior, yet if the human race were limited to this method of learning, all higher forms of intellectual life, all important social advancement, would be retarded for centuries, perhaps rendered forever impossible. There would be no place for deliberation, no weighing of possibilities, no argument as to proper methods of conduct. Slowly and laboriously through the maze of the world, with its millions of blind alleys, man would move about, as severely handicapped perhaps as the lower animals.

Summary. Conditions of life are constantly changing. We need to adapt our behavior to these changes. Consciousness makes it possible for us to do this. Adapting or modifying behavior to meet new situations involves learning. Behavior may be modified

in two ways: (1) through trial and error which is wasteful and which should be reduced but not eliminated; (2) by means of "free ideas," which make possible the higher form of learning and which are probably limited to human beings.

Definitions and Explanations of Terms Used

Learning. The modification of behavior in the light of experience. Because the individual is confronted by new situations he must modify his behavior to suit these situations.

Trial and error. This term is applied to the attempts of the organism to adjust itself to a situation that presents novel features, when such an attempt is made without a definite idea as to what the result will be. One means is tried and then another, until the proper adjustment is secured. Trial and error may be a completely blind, hit-and-miss procedure, or it may in part be directed by consciousness.

Free ideas. Mental images of procedure taken from earlier experiences and capable of being applied to situations differing in some measure from those that preceded. The term "free" is used to signify that the idea in question separates itself from the situation in which it was originally found, and thus is available for application to other situations.

Questions and Exercises

1. In what way is the term "learning" used in this chapter? How does this differ from the way in which you have been accustomed to use the term?

2. When we "learn" a lesson in grammar, is our conduct or behavior modified in any way? How may learning history

modify conduct? Learning arithmetic? Learning spelling? Learning the principles of hygiene?

3. What is the relation of consciousness to learning. How could you judge whether an animal possessed consciousness?

4. Find in your own experience an example of the "trial-and-error" method of learning. Why is this sometimes called the "blundering" method? Under what conditions might this method be employed in the school?

5. What is meant by learning through "ideas of method"? Illustrate from your own experience. In what sense are these ideas of method "free"?

6. Experiment with a dog or cat to find whether animals use "free ideas."

7. In what sense does "trial and error" still persist, even though "free ideas" are utilized?

8. Explain how "trial-and-error" learning is wasteful. How can a teacher reduce the amount of "trial-and-error" learning of his pupils? Illustrate from your own school experience or from some lesson you have observed.

CHAPTER III

SPONTANEOUS BEHAVIOR

In the two preceding chapters the practical significance of consciousness has been emphasized — how it appears in the process of learning and how it is made necessary because the individual is confronted from time to time with new situations, which must be responded to in new ways. It would be a mistake, however, to assume that all learning is conditioned by immediate, practical necessities. For example, the babblings of the infant, the repetitions of his own vocalizations, serve no *immediate* purpose of which he is conscious although they are very important in the processes by means of which he learns to talk.

Spontaneous behavior and its significance. We have, then, in this inborn tendency to vocalize, an illustration of an important principle of learning. Certain actions that are necessary for adequate adjustment, but the necessity for which is not at the time felt by the organism, are provided by nature as a means of suiting the organism better to the conditions under which it must live. The vocalizations of the infant for the time doubtless please him, but he does not know that through them he will gradually gain a stock of sounds and a control over his vocal organs that are to be of immense benefit in his acquisition of articulate and meaningful speech. Were it not for these beginnings, seemingly without value, and certainly of no

immediate practical significance for the child, he would never learn to talk.

Play as a type of behavior. The acquisition by the child of spoken language in its initial stages, as has been said, is an admirable example of learning in advance of any necessity that is actually present in the environment or even felt by the learner. Not only are the babblings of the infant of no significance to him; they are furthermore of no immediate practical value. They do not bring him into better relations with his surroundings; they give no information as to his needs; they satisfy no demands. These vocalizations may be regarded as a sort of play, since they are quite spontaneous and performed with no other purpose than the immediate satisfaction that the activity itself affords. They bring us, therefore, to the question of play and its value in the process of learning.

Play may be considered as a series of more or less related activities that are performed quite spontaneously and for no other reason than the mere satisfaction that these activities yield. Play differs from work, not in the obstacles surmounted nor in the amount of energy expended, but in the spirit in which it is done. When the immortal Tom Sawyer started out to whitewash his fence, it was work for him. He went about his task with reluctance; he did not want to do it. But he made the onlooking boys think it was a holiday pastime, and they took up the job in the spirit of fun. For them the task was play. Objectively, it was just the same set of activities for them as for Tom. Their *attitude* toward these activities, however, really made them different — turned them from work to play.

The value of play as preparation for later life: Groos's theory. For a long time the real significance and value of play were not understood. Because it was mere enjoyment, pure fun, it was regarded as trivial and even unworthy by our Puritan ancestors, and there was little place for it in the home and none in the school. In those days it would have been a rash person who would have advocated play as a means of education. Even when play was not regarded as particularly undesirable, it was generally considered as quite unimportant, the mere expression of animal spirits and excess energy of the individual. Thus it happened that no one knew just what to do with play. Considered either as a necessary evil, at the most only to be tolerated, or merely as an indication of vitality and excellent spirits, no real place was found for it in the world of serious endeavor. The discovery by Karl Groos that play was actually a preparation for the business of later life was almost revolutionary from the standpoint of educational theory and practice.

This theory in regard to the meaning of play at once gave it a place of high importance in the processes of learning. Watch the kitten as it runs after its tail, or, hiding behind a chair, springs at the rubber ball on the floor, or knocks about a spool of thread; see the puppy as it growls and barks at some meaningless object, or as it engages in a mock encounter with its mother or brother. In these activities you can recognize without difficulty many acts which at maturity will be useful to these animals; for they must hunt and fight if they are to survive, and in the playful activities

they are learning the very movements that will help them later.

Of similar significance in the human race are the hunting and stalking plays, such games as " hide-and-seek," " puss-in-the-corner," and " prisoner's base." While most of the activities exercised by these games have lost their original value in civilized communities, they would serve as an excellent preparation for war and hunting, the chief business of the savage. Of more importance at the present time in the preparation for life are such games as playing " store " and " house," and, among girls, playing with dolls. The last named may be regarded as the expression of what is probably an inborn maternal impulse.

Hall's theory of play. It is to be borne in mind that such plays as those above indicated are not spontaneous to the same degree as are the plays of animals. Children's games are usually more or less organized in their character; they are to an extent conventional; they are handed down from generation to generation, the younger children copying the older either purposely or unintentionally. There are, however, children's plays that are less highly organized and which more closely correspond to the play of animals. Examples of these are the aimless shouting, running, teasing, and tussling of little children.

Since such plays as these are of no particular use for the adult in civilized communities, G. Stanley Hall [1]

[1] Granville Stanley Hall (1848–1924) was a dominant figure in American education for nearly fifty years. He founded, at Johns Hopkins University, the second psychological laboratory in the world. In 1888, he became the first president of Clark University, and for more than a decade this institution was the leading center for the advanced study of

advanced the theory that the purely spontaneous plays of childhood represent certain impulses which were necessary to the training of the young under primitive conditions, but which must now be considered as mere survivals of the past, as " vestigial organs [1] of the soul," to use Hall's picturesque expression. Some of these, like teasing and bullying and fighting, may, perhaps, be worse than useless at present. They are survivals of the brute stage of human development; like the vermiform appendix, they are troublesome, but must be reckoned with. Hall held, however, that such barbarous behavior should not be too suddenly repressed. By giving vent in play to these savage impulses, the child frees himself from them in a relatively harmless manner. If these tendencies are too rigorously and suddenly checked, Hall contended, the tendencies behind them might break out in later childhood or in adult life, with serious results. Free play, therefore, even though it be crude and perhaps somewhat savage in character, should be permitted within certain bounds.

Nevertheless, the theory that the child is purely a little savage may be carried to extremes, as it doubtless has been in certain quarters. Although to "haze" the new pupil may be "natural," the teacher must not allow the life of the unfortunate child to be

educational problems. Dr. Hall was the founder of the Child Study movement, a very important development in education. His most important work is his two-volume treatise, *Adolescence*, published in 1904.

[1] The analogy is with the vestigial organs of the body, such as the vermiform appendix, the ear muscles, and the like. In many of the lower animals these organs have important functions. It is believed that in bygone ages they were important to our human ancestors. Their functions were gradually outgrown, but remnants or "vestiges" of the structures still remain.

made utterly miserable on this account. An occasional "tussle" in the schoolyard is a "natural" thing; yet the principal is right when he forbids and penalizes downright fighting. On the one hand we should not regard with too much concern these primitive tendencies in boys; yet on the other, as sensible persons, we must remember that we are living in a civilized community and that both children and adults must conform to its demands in a reasonable way. (See below, p. 51 f.)

While many of the spontaneous plays of childhood are either valueless or worse than useless as a preparation for life under modern conditions, the fact must be recognized that play, a purely spontaneous and aimless activity as far as the individual is concerned, may be of the greatest practical significance, if properly utilized and directed. Play is no longer to be considered as something trivial and unworthy. One of the greatest achievements of the " new education " is the discovery that the play spirit has a place even in the schoolroom. If the child performs his task, not as a task, but because he likes it, he accomplishes more in the end than if he is spurred on to it by hope of high marks or fear of punishment. When there is pleasure in the work, when in some measure it becomes play, the whole tone of the schoolroom is raised.

The limitations of play as an educative agency. Like many other good things, this idea of play in school has been carried too far by many enthusiasts. It is true that the teacher should make the school activities as pleasant as possible, but he should not avoid the essential work or make the tasks too easy simply to please the child. *It is not true that the child should never be forced to do anything that he does not like.* He is to be prepared in the school for later life. There

are many things that he must know if he is to get on. He may not like number work and spelling, but we are not for that reason to allow him to grow up in ignorance of these elements of knowledge. Further, not only is it necessary to teach the child to do certain things that are essential to civilized life, it is also desirable to teach him the value of sacrificing immediate for remote ends. He must do many things in adult life, not because he likes these things, but because the doing of them is bound up with other things that he wants. The mother may not like the drudgery and routine of the household, but she does value an orderly and comfortable home; the business man may not care about adding his accounts, but he does wish his business to be successful. Certain immediate tendencies must be held in check; we must keep our eyes on the "future desirable" as well as have regard for the "present agreeable."

Both in the school and in life, then, we should foster the play spirit whenever possible; we should recognize that anything done is better done when there is joy in the doing; we should, however, never sacrifice the ultimately valuable for that which may give us pleasure for the moment, but which is in the long run of slight significance or even hurtful. The animal acts only under the spur of immediate compulsion. It is the chief distinction of the human race that it is able to keep an eye on the future; to sacrifice the immediate for the remote end — and this is *work*. The human race has been ascending through countless ages from the state of animal contentment to a higher plane of thought and endeavor.

Plays and games as devices for stimulating learning. Not only is the play spirit, when held within reasonable bounds, a most valuable attitude for learning, but the organization of certain play activities in the school may be made of service in indirect instruction. Children in the kindergarten may, for example, learn essential facts about color, number, and form, by playing with blocks, balls, and similar toys. In the more formal instruction of the elementary school, similar devices may be employed to advantage to teach indirectly important facts and principles. Such devices naturally suggest themselves, particularly in geography and nature study. The sand pile may be used to represent mountains, the configuration of continents, the nature of river systems, and so on; through the cultivation of the school garden and the observation of household pets and of animals in the "Zoo," valuable information may be obtained in regard to natural history. In the same way the use of charts, lantern slides, the hand stereoscope, and, above all, the moving picture may, as almost pure play activities, yield much valuable information about school subjects.

There is, however, a danger here that should be pointed out. These various free activities and entertaining occupations and amusements should be utilized in the formal work of the school only with a clear idea both as to methods employed and as to results to be obtained. If you send the children to the "Zoo" or to the museum, you should send them with an idea of finding out something of particular importance for the school work in regard to the animals and specimens on exhibition. They are not only to see; they are to think

as well. The examination of stereoscopic slides and the exhibition of moving pictures are excellent forms of entertainment for children and for adults as well. We could keep our schools and our churches, too, full in this way. Pictures are more interesting than the facts of geology or the hopes of a future life. But in education they are not to be used as forms of entertainment solely; they are to be employed to illustrate important and essential facts. If the school is studying about the mode of life among the Eskimos of Labrador, let the children see the stereograms that illustrate the customs of these tribes; if we desire to bring home a clear-cut moral lesson in regard to the value of kindness, let us exhibit a film planned with this distinct purpose in view and executed by players competent to convey the lesson. To permit such exhibitions without clear ideas as to what is to be taught and how to teach it, and merely for the purpose of entertainment, is to turn the school and the church into places of amusement, when they should be centers of instruction and houses of worship.

Curiosity as an aid in learning. What is true of play as a means of learning beyond the immediately recognized necessities of the situation, applies to other apparently inborn tendencies of the individual. Chief among these is curiosity. *Curiosity is an impulse to discover merely for the sake of finding out. It seeks knowledge for its own sake and for no ulterior purpose,* and is to be contrasted with seeking for knowledge because we vaguely or clearly realize that the knowledge will help us in accomplishing some purpose that we have in view.

It was for this latter reason that I carefully studied the lights on the bay during the trip from Newport to Providence, previously described. I wished to steer a straight course and was obliged to attend to the lights. If, however, I had been in no way responsible for the safe handling of the boat, if I had been merely a passenger without care or worry, probably I should have looked at the lights in a purely inquisitive way, with no thought of their practical significance. In this way, it is true, I might have gained a knowledge of the bay that would have been of advantage later on. Thus, while for the time being my idle curiosity would have been of no particular advantage, it might have given me a store of possibly useful information for a future need. Indeed, as events turned out, I could but wish that I had had opportunity and desire to employ this idle curiosity on previous trips at night on the bay. Then I might not have picked up the wrong light and have suffered imminent danger of shipwreck.

We can see on all sides the manifestation of this tendency to be curious, particularly in the child. At a certain age almost every child asks innumerable questions, not waiting for answers and apparently not consciously caring for them. The small boy investigates all sorts of objects, and his desire to do this causes him to take them apart and even to destroy them, for he is impelled to know just what they are and how they work. This primitive curiosity is responsible for some of the cruelty that the child unwittingly inflicts on bugs and flies. He may have no conscious desire to hurt them; he is impelled, rather, by the desire to see how they are put together.

Curiosity, then, gives us a stock of knowledge that some day may be useful, though just at present it may seem dead lumber, which cannot be economically kept in the storehouse of the mind. Indeed, a great deal of what is acquired in this haphazard way may never be

of the least service, such is the prodigality of nature in providing for the future. It is evident, however, that this curiosity, if directed toward the learning of useful facts, may be of the greatest educational significance. Of course it is just at this point that the wise teacher determines what things his pupils should know, and stimulates curiosity in regard to them by all legitimate means. If the child can only be made to feel that there is something in what he is studying that is sufficiently interesting and even mysterious to warrant an investigation, the rest will take care of itself. The average boy is curious enough about aviation to work out some of its fundamental principles, once he has been started on the right road; most school girls are sufficiently endowed with a native stock of inquisitiveness to learn about the customs and costumes of the early American colonists if they are properly introduced to the subject. In view of these facts, the notion that the pupil will learn with interest only that for which he sees an immediate *practical* use is obviously untenable. He will learn much simply because he is curious, and this learning if properly controlled may be as practical and useful as any other.

Summary. Not all learning is conditioned by immediate practical necessities; not all learning comes about through responses to a felt need. Spontaneous behavior may be of immediate benefit or it may start a set of useful acts which will be serviceable later. Play and curiosity are valuable aids to learning. They are among Nature's provisions for getting the learning process started. As an educative agency, however, each has its limitations.

Definitions and Explanations of Terms Used

Play. An activity performed quite spontaneously and for no conscious purpose beyond the activity itself. Both curiosity and play provide the individual, in advance of any practical necessity, with information and skills that may later serve some useful end. Both play and curiosity are pleasurable activities, and the spirit that accompanies them is a valuable stimulus to learning.

Work. An activity not essentially pleasurable in itself, and hence not undertaken for its own sake, but for a purpose. It has to do with ends relatively remote. In man it is usually accompanied by " active attention," as will be pointed out later.

Curiosity. A tendency to acquire knowledge for its own sake and in reference to no recognized practical end.

Questions and Exercises

1. In what way may an activity for which one does not see a present practical use be beneficial? Give illustrations.

2. Define play. Explain how the playful activities of young animals, such as the kitten or the puppy, may be useful in preparing for the later activities of the animal.

3. What are some of the useful results of play in childhood? Name some common games of childhood (hide-and-seek, prisoner's base, etc.), and show how the movements that these games exercise might have been useful to a man living under primitive conditions.

4. Discuss Hall's theory of play. What games of childhood are important from the point of view of Hall's theory? What should be the attitude of the teacher toward the rougher plays of the school ground?

5. What is meant by "spontaneous" play? Under what conditions may games that are directed by adults be valuable for children?

6. Under what conditions may the "play attitude" be employed in the actual work of instruction in the school? Give illustrations of games that might be employed to advantage in some phases of teaching language, arithmetic, geography, spelling.

7. State some dangers of overemphasizing the play element in education. Can you justify the statement: "The child must often be encouraged to do tasks that he does not wish to do"?

8. What play elements are involved in the educational use of museum materials, stereopticon pictures, the stereoscope, moving pictures, etc.? What principle should govern the use of these materials in the school?

9. Define curiosity. Of what value would this "prying" impulse be to primitive man?

10. Give instances of facts that you have learned merely because you were "curious to know." Have any of these facts proved valuable to you later?

11. In what ways may the curiosity of children be properly and helpfully stimulated in school work? (Take specific subjects such as arithmetic, geography, natural science, spelling, drawing, etc., giving illustrations of useful knowledge that may be gained under the spur of curiosity.)

CHAPTER IV

ATTENTION, INTEREST, AND EFFORT AS RELATED TO BEHAVIOR

In Chapter I the fact was emphasized that interest and attention are the invariable accompaniments of consciousness. An absolutely disinterested and inattentive state of consciousness does not exist. We are merely relatively disinterested and inattentive. In states of day-dreaming and the like, when our "wits are wool-gathering," and when we are interested in nothing in particular, the crest of the conscious wave is low and broad. Such a state may be described as inattentive and disinterested when compared with a state of concentrated attention, when our entire thought is focused on some problem to be solved, and when the wave of consciousness may be said to have a high and narrow crest. However, in any state of consciousness there is a degree of concentration and hence at least a minimum of interest and attention. It is further to be remembered that we often speak of a person as being inattentive when he is simply not attentive to a certain aspect of the situation that we think should be emphasized. The man who forgets to execute the little commissions intrusted to him in the morning is inattentive to these matters because he is more interested at the time in his business; he may be very attentive as far as the affairs at the office are concerned.

The relation of attention to interest. When we attend we feel interested, although we may not be interested in that to which we attend at a given moment. If a child attends to his arithmetic lesson, he is interested in the lesson either *directly* or *indirectly*. He may be directly interested in it because he likes to work with numbers, because he is " good " in arithmetic, or he may be indirectly interested in the lesson because he wishes to please the teacher, to excel among his fellows, to win a prize, to " pass," to get out of school on time, to escape a scolding or something worse, to be praised, to please his parents, or what not. When a pupil is interested in a task, we say he is in a state of " readiness," which means that he has a " mind set " to do it — he feels like doing it. If a pupil is inattentive to a task we may be sure that he is " unready " for it, not interested in it either directly or indirectly. He sees neither its immediate nor its ultimate value. When we are interested and therefore in a state of readiness for engaging in a certain activity, we are disinterested in and unready to engage in other activities. *The greater the interest, the more concentrated the attention.* The teacher says, " Pay attention," when perhaps the pupil is giving his very best attention — but not to the lesson at hand. He is interested in the tune of the barrel organ outside, or thinking of the ball game to be played when school is over, and his highest attention is directed toward the things in which he is most keenly interested.

Definition of attention. In attempting to define attention, two questions must be considered: (1) what attention *is* and (2) what it *does*. From the first point

of view, attention may be defined as a *state* of consciousness, certain parts of which are either relatively *clear* or relatively *vivid*, while other parts are obscure, unclear, indistinct. From the second point of view — what attention *does* — it may be thought of as *the selective function of consciousness*, serving to *emphasize* certain details and to *ignore* others. Still we should be careful when we use the term "selection" not to think that this implies some mysterious mental "power." We mean merely that certain parts of consciousness stand out clear, or come before us with an emotional intensity, while other parts are relatively obscure, or without significance. The "choice" that is exercised is that of consciousness itself over the processes that are entering into it or tend to enter in. *What is attended to is determined by the purposes, the aims, the interests, the desires, the urges, that exist in consciousness either dimly or clearly at the given time. Attention cannot be secured and held unless the object attended to possesses either an immediate or a derived interest of some kind.*

For example, my present state of consciousness decides whether a faint noise that I barely hear shall be attended to or not. If it is of some interest, if it has a meaning and significance, if it fits into the purposes, impulses, or urges that dominate me, then it comes clearly into my experience; if it has no such interest and no such meaning, it drops out. The mother hears the faint cries of the infant in an adjoining room, and immediately she is "all ears," because the sound means something to her; on the other hand, she is but vaguely aware of the rattling of a heavy truck over the pavement just outside, for this latter noise is of no significance to her at the moment in question.

I have a task before me which I wish to finish; it is my purpose to accomplish it, and I refuse to attend to various kinds of distract-

ing experiences, because these do not fit into what I have to accomplish. Hence I do not listen to the band that is playing, nor gaze at the procession that happens to be passing my window at that particular time. But my boy, who is going to the circus in the afternoon, rushes eagerly to the door to look at the parade, for this fits into his particular purposes and agrees with the interests and impulses of the time being.

Kinds of attention.[1] It is important to keep in mind that *we always attend to those details of a situation that have for us some interest or value.* However, this attention may be of two sorts, depending on whether the interest that calls it forth is immediate or whether it is relatively remote. If the object attended to has an immediate value, then we give to it *passive* or *involuntary* attention. The object seems to seize upon the mind and control it. We cannot help giving our attention. When the mother listens to the cries of the child, she is giving this passive variety of attention. There is no effort on her part; she *has* to attend, she *wishes* to attend. The same is true of the boy who hurries to the door to see the procession go by.

However, seated in my study, I am attending to the task that I have before me, not because of its immediate interest, but because of an end that I wish to accomplish. My interest in the task is derived from my interest in the remote end.

[1] The classification of attention under the three heads, primary passive, active, and secondary passive, is that proposed by Edward Bradford Titchener (1867–1927), a leading student of psychology and a vigorous writer in his chosen field. Among his best-known books are *An Outline of Psychology* and *A Primer of Psychology*. An Englishman by birth, he spent most of his professional life as head of the Department of Psychology in Cornell University.

The former type of interest — that which follows our immediate desires — is sometimes referred to as intrinsic, the latter as extrinsic interest. As a matter of fact, I should like very much to go to the window and see the parade myself, but I am kept at my desk because I know that I must finish my work at a certain time if I am to accomplish what I have set out to do. My mind is on the remote rather than the immediate end. I am not giving passive or spontaneous attention, but *active* attention. I hold my mind to what I am doing with a certain consciousness of effort. I am aware that I am controlling my own thought processes. They are not being directed from without.

Laws of primary passive attention. With the very small child and with the animal, all attention is of the passive, spontaneous, involuntary type. We start out in life by attending in this passive way to various objects and activities that have for us some immediate interest. Bright lights, loud noises, and other intense sensations possess originally this power of calling forth attention. They *make* the infant notice them. In this purely passive way we also are interested in moving objects as contrasted with stationary objects. Further, we always attend when there is any marked change in the situation, when it offers novel features, because something has either been added or taken away. In the latter case we attend to that which is absent and recognize it by its lack. We perhaps do not notice the tremor of the boat directly, but remember it when the engines have stopped. This is because we ignore the customary and attend to the unusual. Further, we invariably give attention to unpleasant experiences

and to our organic needs and wants. If we are very hungry or are suffering from a severe toothache, we are insistently aware of the fact. When the digestive processes are going on normally, we are quite unconscious of them, but an attack of indigestion may make us unpleasantly aware of the existence of a stomach and a liver. Among other experiences that tend to call forth spontaneous attention are those that come in a rhythmic manner. Many a child gives heed to rhyme and jingle even though he may have no comprehension of, or interest in, the meaning of the stanza of poetry that he is asked to commit to memory.

Consequently we may say that attention of this primary passive type is given to intense, moving, novel, unpleasant, contrasting, and rhythmic stimuli, and to stimuli arising from the vital bodily functions, because we are by nature interested in such stimuli.

The significance of primary passive attention. Experience is first built up through these primitive and probably inborn *tendencies to attend.* They may be thought of as racial rather than individual in their character. It can easily be seen that, under primitive conditions of life, the animal that did not attend to intense experiences of various sorts would be likely to fail in the struggle for existence. The very intensity of these experiences is an indication that they are right at hand to be counted with. This is also true of movement and of certain types of repetition. Likewise, the new and the strange must be counted with. The young bird at first fears everything; it learns what is safe only through experience. It seems necessary for the primitive consciousness to assume that the new

is unfriendly and unsafe until its innocuous character has been established. Unpleasant experiences are often harmful, and the organism that ignored them would not survive. Likewise hunger and thirst and the other organic sensations represent nature's demands that something be done to satisfy bodily needs. They *must* be attended to. Finally, while rhythmic experiences do not in the same way seem vital to life, and while no one knows with certainty the reason why rhythm "naturally" attracts us, it is to be remembered that the whole organization of the world, both internally and externally, is expressed in rhythms. Things come and go in a regular order. Night and day alternate, the seasons change, as the earth, circling around the sun, comes back to the same relative position from which it started. Within the human body there are also rhythms and periodic changes, some brief and others extending over years. As will be pointed out later in this chapter, attention is itself a rhythmic process. No wonder, then, that rhythm means so much to the race.

So powerful are these fundamental and probably inborn tendencies that they never can be entirely overcome. We attend against our wish to the flashing of the lightning and the crashing of the thunder. The constant drip, drip of the water on the pavement outside our window, we cannot ignore, and it keeps us awake. Someone moves across the room, and we turn from our task to look, even against our wish. And so it is with the rest of these tendencies, probably planted deep by inheritance in our very being and as old as the race itself. We begin life with them; they first build

up our world; and, though we may go beyond them, we can never put them entirely aside. Experience has shown that, when other means of calling forth attention fail, these primitive tendencies must be brought into play to assist in directing the mind into desirable channels.

If the child's interest lags, make vivid the object that he is to attend to, and his wandering thoughts will return to their proper place. Emphasize, repeat, reiterate, and gradually the desired attention will be called forth. If the lesson is dragging, introduce a change of some sort, even if it is nothing more than to go to the blackboard and draw a diagram. Better still, get the pupils to do something, for almost always there is interest in self-activity. Facts cast in the form of verse are often more easily learned than when presented without such aid. A painful experience is sometimes the only thing that will impress a dull mind. It has been found in studying the behavior of animals that they learn more quickly by being punished for failures than by being rewarded for successes. The rat that is learning to thread his way to the center of the maze will get there more quickly if he is given an electric shock every time he enters a blind alley than if the stimulus of the food solely is relied on. What is true of the animal is probably to an extent true of the child. That is to say, education cannot entirely dispense with pain as a stimulus.

The principle of active attention. As development goes on, these crass and insistent objects of attention lose some of their force, and we acquire the ability to attend to those parts of a situation which have in themselves no immediate interest, but which lead to something desirable that is ultimately to be attained. The bank clerk may take no pleasure in adding up long columns of figures, although as a child this activity may have given pleasure for a brief time; but he keeps at his task because he desires to be efficient in his call-

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ing or perhaps because he hopes that his diligence will secure him promotion. Thus, he gives active attention, and sacrifices the immediate pleasure for a remote end. And *this is the fundamental principle of human progress, this ability to hold the mind to that which at present exists only as an aim to be achieved or an ideal to be realized.*

An idea of an end to be gained which thus stimulates us to attend to tasks that are not themselves attractive is called an *incentive*, a *motive*, or a *purpose.*

The rise of secondary passive attention. If one perseveres in one's task, however, it is likely that the type of attention will change. The details that were first held in clear consciousness only by effort come to be attractive in their own right, so to speak. Remote ends tend gradually to be replaced by immediate ends. Extrinsic or derived interest is gradually replaced by intrinsic or immediate interest. Whereas at first we may have been interested solely because we saw the matter at hand as a means to a desired goal, later we may become interested in the means for its own sake and apart from the end. The clerk may often have to hold himself to his task because of the ideas of the future, but as he perseveres the work itself comes to hold him. His attention is no longer active; it is again of a spontaneous variety.

It is an underlying fact of mental life that this substitution is often made. Frequently that to which we gave active attention at one stage of our development is finally attended to through "secondary passive attention." *Secondary passive attention is like primary passive attention, except that the latter is primitive and*

probably dependent on inborn traits while the former has been acquired through a preceding period of active attention. Thus we start out in life equipped solely with primary passive attention; then we acquire the ability to give active attention; this in turn is transmuted into secondary passive attention, and the whole process is begun again. Even after we have acquired an interest in our work, it may sometimes lose its attractiveness, and then we must hold ourselves to it by thinking of what it means to some future goal or to some ideal. Often the struggle is over in a little while. Secondary passive attention once more comes into play.

Variety in unity the secret of sustained attention. At the outset of this chapter it was suggested that the stream of consciousness may be likened to a series of waves, each with its crest and valley. These waves correspond to the shifts in attention, and this rhythmic rise and fall of the attentive consciousness is one of its chief characteristics. There are rhythms of a few seconds of duration, others of minutes and even hours; there is also evidence of even more extended rhythms. Thus there are waves within waves, and the conscious stream must be considered as extremely composite.

If the teacher wishes a topic to be held in attentive consciousness by the pupil, he must develop it in a variety of ways so that when the attention "lets up" in one direction, it will focus itself on another detail of the topic, and thus the mind will be constantly held within the circle of the subject under discussion. This in part explains the growth of attention and interest as the pupil learns more and more about any of the school subjects. There is always a new aspect that can be

attended to when there is sufficient variety in the subject matter. It should be kept in mind, however, that if progress is to be made in learning, this variety must be a variety of related topics. The various aspects of the study must be organized in such a way that they form a coherent whole. Thus it seems certain that *the more complex a physical object, or the richer in content an idea, the longer attention of a sustained character can be given.*

Attention and fatigue. What is often thought of as fatigue is really a form of the fluctuation of interest and attention. After the mind has been busy for some time on a mental task, attention decreases, not because there is genuine weariness, but because the individual gets " tired of " the task. He loses interest in it. The remedy for this *ennui* is obvious. On the one hand, genuine interest in the task must be increased, and, on the other hand, the pupil must be accustomed to ignore those distracting influences that in a short time set in to make mental work distasteful and to lure him away from it. When a task is undertaken, it may often be approached with a degree of reluctance. In some instances it requires a short time to get " warmed up," so that attention can be properly concentrated. This " warming-up process " takes a longer time with some individuals than with others. With the same individual some tasks require a negligible amount of warming up, others require a considerable amount. The more of a task it is (using the word " task " in its everyday sense) the greater the amount of warming up that is needed. The nature of fatigue is treated with greater detail in Chapter XV.

The conditions of effective work. For this reason *the first stages of a task should be made as clear and interesting as possible.* Above all, the pupil should be led to realize that he should never yield to the initial lack of interest and that he should cultivate in his school work the ideal of settling down at once to aggressive effort on a given task. Often half of one's time and energy is wasted in the "agony of getting started." After the warming-up stage has passed, most of us continue to work steadily for a longer or shorter period. If we learn to ignore distractions, we may continue to hold our attention on our task and to keep our interest alive until really fatigued or "worn out." Of the greatest importance is the fact that by making an effort one can often become interested in tasks that are not at first attractive.

Obviously this period of effective mental work varies with the disposition of the individual and with his age. Young pupils, as a rule, cannot work uninterruptedly so long as can older pupils and adults. School children should be encouraged, however, to keep at their study over a considerable period, and not think that because they have worked fifteen minutes it is time to quit. We often get the idea that we have worked long enough, and then we begin to feel fatigued. There is little danger of the normal child seriously overworking in school. Authorities are at present of the opinion that dangerous fatigue among American school children is rare. At the same time it should be emphasized that ill-health often causes one to fatigue easily and quickly. If children who appear lackadaisical in their school work are at the time either flushed and

feverish or unusually pallid, concentrated attention should not be expected or requested.

How many objects can be attended to at once? The question of the span of attention, *i.e.*, of the number of objects that can be held in the mind in a single moment of attention, is not altogether settled. If a person is shown a number of dots for an instant, he will be able to recognize five or six correctly. Above that, he becomes confused; and if the number is to be known accurately, the dots must be exposed long enough to enable the observer to count them. If, instead of dots, characters differing among themselves are shown, one can grasp a smaller number in a single instant, particularly if they are unfamiliar. One can recognize more letters of the Roman alphabet, or more numerals, than Chinese characters, and one can distinguish more letters when they spell syllables and words than when they are unrelated. In general it may be said that surprisingly few elements can be recognized in an instant of attention *unless they are in some way joined together in a significant whole.* This fact once more emphasizes the importance of organizing and relating to the greatest possible extent all parts of the materials of instruction.

Attention and behavior. Up to the present point in this chapter, attention has been considered solely on its subjective side, *i.e.*, from the standpoint of its conscious aspects. Equally important is its consideration as an aspect of behavior. It is to be remembered that we interpret attention in others through their behavior. Further, effective conscious behavior is always conditioned by properly concentrated attention. If we

watch a dog that is trying to open a puzzle box, we shall observe that his relative lack of success is due largely to his inability to keep to his task. He attacks it vigorously for a moment, then perhaps he gives it up entirely for the time, to renew it later in the same haphazard and desultory manner. Every teacher in the primary grades must be impressed with the fact that one of his chief problems is to secure *sustained* attention. The young child, both in his work and in his play, resembles in his behavior the lower animals. He cannot keep at one thing for any length of time. Defectives and, in general, weak-minded individuals show by their actions how difficult it is for them to give attention to anything for more than a brief moment. It is the mark of a developed mind to be able to stick to a difficulty that one is attempting to master.

Summary. There is always some degree of attention when consciousness is present. Our interests determine to what we shall attend. There are three kinds of attention — primary passive attention, active attention, and secondary passive attention. Primary passive attention is probably determined by inherited or native traits. When we give primary passive attention we are instinctively interested in the thing at hand. We give primary passive attention to situations which involve intense, moving, novel, unpleasant, contrasting, and rhythmic stimuli, and, also, to stimuli arising from the vital bodily functions. When we give active attention we are not interested in the matter at hand, but rather in a remote end to which this matter is a means of achievement. When we give

secondary passive attention we have again learned to attend. In this case our interest, which had been in the remote end and hence a derived interest as far as the matter to be attended to is concerned, becomes attached to the means as an end in itself. We become interested and therefore attend to the matter for its own sake apart from its relation to our larger aim or purpose.

The richer the content of an idea, the more angles from which we can view it, the longer will it command attention. What is commonly called fatigue is not so much being " tired by " as being " tired of " a certain task. We are uninterested in it and are therefore inattentive to it.

Definitions and Explanations of Terms Used

Attention. A *state* of consciousness, one part of which is relatively clear or relatively vivid, while the other parts are relatively obscure.

Primary passive attention. A state of consciousness in which the situation inherently claims the entire attention without any sense of effort.

Active attention. A state of consciousness in which the individual attends to a situation that does not inherently attract attention, but which is recognized as important because of its bearing upon a more or less remote goal. Active attention is usually accompanied by a distinct sense of effort.

Secondary passive attention. A state of consciousness in which the individual has learned through a period of active or effortful attention to hold his mind to the situation, until it becomes attractive in itself. Hence

secondary passive attention is spontaneous and often quite without conscious effort.

Interest. The feeling which makes possible the securing and sustaining of attention.

Incentive or motive. The idea of an end or goal which impels one to active attention; which impels one, in other words, to sacrifice the immediate for the remote.

Mental fatigue. Mere lack of interest or *ennui* must be distinguished from actual fatigue in the sense of exhaustion. A large amount of so-called mental fatigue is of the former sort. Few school children suffer from injurious fatigue.

Fluctuation of attention. This signifies the rhythmic character in which attention manifests itself; now a certain aspect of consciousness is emphasized, now another.

QUESTIONS AND EXERCISES

1. Illustrate from your own experience how attention selects and emphasizes certain elements of consciousness. Fix an object in your attention; note some of the differences between your consciousness of the object *attended to* and your consciousness of the objects of which you are still aware, but not attentively.

2. Note during a period of five minutes the different objects and ideas that you attend to. Determine as far as possible *why* attention is given to these objects and ideas rather than to others.

3. As you are working on some definite problem, note the objects and ideas, unrelated to the problem, that tend to *distract* you. Can you tell in each instance why these tend to attract attention to themselves?

4. Note in as choolroom or at church the factors that seem to distract the attention of a number of persons from the exercises in hand. Can you tell why these elements distract?

5. Make a list of objects and activities that appeal to primary passive attention.

6. Illustrate the useful employment of primary passive attention in the school.

7. Define active attention. Find illustrations in your own experience. Why is it difficult to give active attention?

8. In what way is the ability to give active attention the condition of human progress?

9. What is meant by secondary passive attention? How does it differ from primary passive attention? From active attention?

10. Can you find an instance in your own life where a permanent and valuable interest has been developed without passing through a stage of effort and struggle — that is, through a period of active attention?

11. Name some more or less "remote" ends that have, in your experience, governed active attention. Is the idea of an examination a more effective "incentive" to active attention than the idea that a study may be helpful to you in later life? How do high grades in a school subject affect your subsequent work in that subject? What effect have low grades?

12. Name some incentives that you consider it legitimate to utilize in school work as spurs to active attention. Name some that you believe to be dangerous or undesirable. Give reasons for your choice.

13. Distinguish between immediate or intrinsic and derived or extrinsic interest. With what type of attention is derived interest associated?

14. What is meant by the "span" or "range" of attention? What suggestion can you find for teaching in the fact that we can attend to a wider range of objects when they are related or organized than when they are unrelated?

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CHAPTER V

BEHAVIOR AND THE FEELINGS

Throughout the preceding discussions the rôle that the feelings play in consciousness has been frequently referred to. The present chapter will consider more in detail the nature of the feelings, both in their simple and in their more complex forms. The term " feeling " is often used loosely in daily life to refer to many states of consciousness which the psychologist denotes by other terms. In the present discussion it will be employed, in accordance with the best usage, in a more restricted and definite sense.

The nature of feeling. The feeling aspect of consciousness is that which gives value or worth to an experience. I not only know something, but I am affected in a certain way by it — I have a feeling with regard to it. I look at a bright and rich color. I *recognize* or " sense " it as a gorgeous purple and at the same time I experience *pleasure* in seeing it. I learn of the death of a friend and, in addition to my *knowledge* of the event, I *feel* sorry. We not only *know* the events in the life of Abraham Lincoln, but we *admire* the man that lived this life. We not only *know* that an act is cowardly but we *despise* the coward. The feelings give the personal " tone " to our consciousness; they touch what would otherwise be the indifferent grays of our conscious life with bright or with

somber hues. Without feeling, existence would be devoid both of pleasure and of unhappiness; joys and sorrows would vanish, and even good and bad would be meaningless terms. Experience would be bereft of all human values, and we should gaze with the eye of calm indifference on the unfolding of the world's events. Nothing would matter, for we should not care. The most trivial event and the most terrible catastrophe would find us alike unmoved.

It would seem then quite necessary that feeling, like attention, should be a characteristic of all of our conscious experiences; indeed a mental state that is not in some way "colored affectively" — that is, tinged with feeling — is probably an impossibility. It is true that many psychologists hold that there are numerous mental states that are "indifferent," or unaccompanied by affective elements. The fact seems to be, however, either that such states are relatively not rich in feeling, or that certain aspects of them are indifferent, while others have a feeling value. In any case feeling is so definitely related to conduct that, for all practical purposes, we may assume it to be an invariable ingredient of conscious life.

Feeling as an element of consciousness. Affection or simple feeling, like sensation, which we shall discuss later, is regarded by some psychologists as a fundamental *element* of consciousness. It seems never to occur alone, but always in connection with some sensory experience. Apparently its function is to indicate the worth of that experience — whether it is "good" or "bad" for the organism.

Feelings vary in two ways. They are either pleasant

or unpleasant. If they are pleasant they are sometimes said to be "satisfying," if unpleasant, "annoying."

The earliest and most fundamental form of unpleasantness is that which accompanies the sensation of pain.

Pain, however, is not to be used as a synonym for the unpleasant, since the word "pain" is used in psychology to designate a distinct type of sensation. There are also many unpleasant experiences that are painful only in a figurative sense, and, further, certain mild pains of short duration may be not only not unpleasant, but slightly agreeable. However, pain may be considered for practical purposes as essentially unpleasant. On the other hand, there seems to be no sensation that is as uniformly pleasant. Even experiences that are normally very pleasant may become, if intense enough, or if long continued, quite unbearable.

The function of the unpleasant and of the agreeable. Unpleasant experiences may be taken as indications that the organism possessing them is in some way out of adjustment with its environment. They demand that a change be made, that a better adjustment be secured. On the other hand, pleasantness would indicate a satisfactory adjustment. States of pleasure occur in their clearest form in contrast with previously unpleasant states. They come to stamp with approval behavior that has resulted satisfactorily. They tend to continue, at least until this behavior has been permanently established.

Feeling and efficiency. Generally speaking, pleasurable experiences raise the tone of the organism; there is a more intense vitality and a correspondingly greater possibility of accomplishment. On the other

hand, the unpleasant is depressing in its effect; it tends to lower vitality and reduce efficiency.

Not only do the pleasant and the unpleasant have marked effects on bodily conditions, but likewise the bodily condition works directly to produce states of agreeableness or disagreeableness. Depressing news may bring on an attack of indigestion, while equally well a digestive disturbance may cause a period of mental depression. From such facts it might be inferred that pleasure considered in its immediate results is always good and the unpleasant is always bad. However, since the latter serves as a warning and ultimately may lead to a better adjustment, it has its place and justification in the scheme of things. Without it the race would have perished long since.

It is also true that certain forms of behavior that were good for the organism living under primitive conditions are no longer good when the conditions of life have been modified. The " pleasant " feeling-tone continues to attach to them, however, and the " unpleasant " feeling-tone similarly attaches to forms of behavior that were once ineffective or dangerous, but are now perhaps effective and valuable.

We may lay down the general principle *that necessary unpleasant experiences should never be avoided, while pleasures that lead to no harmful results should be encouraged. Pleasure is often to be justified as an end in itself, the unpleasant never as an immediate end, but only by its ultimate results.* The misdirected sympathy which would eliminate all unpleasantness from an imperfect world that demands the directive influence of pain and suffering, is misguided; but no more so than the

harsh Puritanism that sets an exaggerated value on the hard aspects of life, apparently for the sake of the unpleasantness that they involve. It is a safe maxim for both the teacher and the parent to follow — "Surround the child with all the happiness possible, but do not hesitate to bring the unpleasant into his life if, by so doing, a permanent good may be accomplished."

Complex forms of feeling: the emotions. The simple affections of pleasantness and unpleasantness, as they develop in the experience of the individual, sometimes work over into more complex affective states, of which the emotions are the most striking and the most important.

We all recognize that there are in our lives two large types or patterns of experience. For the most part, our conduct is ordered on a routine plan. We meet the ordinary situations of life in a fairly uniform manner. It is true that we solve new problems, and deal with situations that are somewhat novel; but, in general, we live the fairly even conventional life of civilized society.

Standing forth clear and sharp against this background of the usual and the conventional, however, are the periods of storm and stress — great crises, marked by intense, though confused, mental activity; by violent, though abortive, bodily expressions. Our lives are no longer calm and placid. The customary channels of habit and thought are blocked. Turbulence and confusion reign supreme, and from these storms the individual may emerge, as it were, into a new world, his mode of life transformed, his standards and sanctions set anew, his perspective readjusted,

and his vision perhaps clarified, perhaps permanently dimmed. These are the moments when we are paralyzed by fear, overwhelmed by anger, thrilled with joy, bowed down in grief, exalted with elation, surcharged with sympathy, maddened with hate and malice, deadened by despair, rejuvenated by hope, or awed with reverence. And to these intense, turbulent, deeply moving experiences the name "emotion" is applied.

Characteristics of an emotion. The emotions have been considered in different ways by different writers in psychology. Some regard them as intensified feelings — feelings that stir the individual profoundly and leave his mind in a state of turmoil. There is a certain justification for this view. It is a common experience that anger and fear, for example, when at all intense, quite upset us.

Other psychologists emphasize the strongly instinctive basis of the emotions, and hence regard them as native or inborn feelings. Here, again, there is probably a truth. A highly emotional experience seems to take one back to elemental, even primitive, conditions of life. Any one of the inborn tendencies may work itself out in strong emotional expression under certain circumstances. A primitive "urge" *when checked in its expression* often sets up a disturbance in consciousness and in the behavior accompanying it, and this disturbance is clearly an emotion.

Again, it has been pointed out that in an emotion there is always some object that is related to it, while in simple feeling no such object need be present. I may feel unpleasant without being aware of any object

to which the unpleasantness attaches itself, but if I am angry, I must be angry *at something;* if I fear, there must be something that is connected with this fear.

The necessity of an object toward which an emotion is directed is well illustrated in the case of certain mental diseases that have marked emotional accompaniments. The patient is in constant terror, for example, and yet there is nothing in the external world that should arouse this terror. It is the invariable case, however, that the person afflicted imagines something in his surroundings that he fears. Otherwise the emotion could not complete itself. His mental condition arouses a complex feeling state, which becomes a genuine emotion only when there is a fancied object to which the terror attaches itself. When there is no object, there is in the proper sense of the term no emotion.

The James-Lange theory of emotions. An important theory in regard to the nature of the emotions was set forth by Professor James [1] about 1890. Similar conclusions were reached independently by Carl Lange, a Danish psychologist, at about the same time; hence this theory is known as the "James-Lange theory." It is based on the recognized fact that in emotions of any intensity there is a strongly marked accompaniment of certain bodily sensations, such as trembling of the knees, chills running down the spine, "goose flesh," palpitation of the heart, a "sinking" in the stomach, and the like. These bodily or *organic*

[1] William James (1842–1910) was one of the most distinguished scholars that America has so far produced. By training a physician, he later became a profound student of psychology and philosophy. He taught for several years in Harvard University. In addition to his *Principles of Psychology,* published in 1890, he put forth in 1899 a delightful series of addresses, *Talks to Teachers on Psychology, and to Students on Some of Life's Ideals.*

sensations were formerly thought of as the result of the emotional excitement, but according to the James-Lange theory they are rather the cause. They constitute the very essence of the emotion. According to James, they really *are* the emotion.

This theory has caused a great deal of discussion; but while many psychologists would be unwilling to go to the extent of saying, as does James, that the sensations accompanying these bodily changes *are* the emotion in its entirety, most would agree that they form a very important and probably an indispensable element in our emotional experiences.

The emergency theory of the emotions. While the practical value of the simpler feelings is fairly obvious, the usefulness of the emotions is not so easily demonstrated. Although it is generally held that emotional experiences are undesirable because of the turmoil into which they throw the individual and the havoc that they work in the thought processes as well as in the physiological processes, it is true that, in the throes of fear or anger, the physiological changes which are taking place within the organism often enable the individual to put forth unusual effort. The dominance of intense rage increases the chances that one will attack and destroy one's enemy, and when possessed by intense fear one can run away with surprising speed and thus perhaps save one's self from destruction. These changes are due primarily to glandular secretions. For example, during fear and anger the adrenal glands are overactive. This increased secretion of adrenalin depresses digestive processes, increases heart and lung activity, causes the liver to liberate sugar

which is the fuel for the muscles, and is believed to affect profoundly other glands and many organs. Thus it is conceivable that these intense mental disturbances play an important rôle in the life of the individual by releasing at critical moments quite unsuspected reserves of energy. This explanation is known as the " emergency theory " of the emotions.

Behavior and the emotions. The most helpful point of view from which to regard the emotions is not any one of those discussed above, however, but the point of view which considers the conditions which give rise to emotional expression. *An emotion never occurs except under conditions of unsatisfactory or incomplete adjustment.*

In an earlier part of the present chapter it was held that unpleasant feelings were the accompaniment of unsatisfactory adjustment, *i.e.*, of behavior that did not bring the organism into entire harmony with its environment. *Mere unsatisfactory adjustment, however, does not give rise to an emotion. There must be added the fact that the behavior is not sustained in any one direction for any length of time and that it is incomplete in the sense that it fails to attain any result, whether pleasant or unpleasant.* There is more or less suspense in behavior under the stress of the emotion. It is uncertain and fluctuating. There are rapid shifts in attention and, connected with this, relative confusion in the thought processes.

Clear thought and definite action kill the emotion. It has long been observed that emotion is opposed to clear thinking. It is likewise true that an emotional state is unfavorable to the certain and sustained execu-

tion of any act. If the person under the influence of the emotion can only succeed in doing something definite, the emotion will tend to disappear. This view of the emotions helps to explain the feelings of bodily disturbance accompanying them. The intense feelings for the time being are unable to work themselves out in proper behavior, and there is a discharge of nervous energy throughout the entire body, stimulating the ductless glands to violent activity, setting in commotion heart and lungs, upsetting circulation and digestion, making the body tremble and the very hair stand on end. Perhaps some one insults me, and I am so wrought up that I do not know what to do for the moment. I cannot adequately deal with the situation. An intense feeling of rage possesses me; deep-seated tendencies harking back to the primeval jungle surge through me, as I shiver and thrill with the ebullitions of my passion. Then I strike out at the object of my rage at first blindly, but later perhaps effectively; and, as I become master of the situation, my emotion vanishes. Or perhaps I yield to less savage tendencies and master the situation with the thoughts of my superiority over my aggressor, and so turn away with a smile of contempt on my lips. Whatever happens, however, *I do not rid myself of the emotion until in some way by a definite act or by a train of ideas that stand for acts, I become master of the situation*, and happily or unhappily cope with it.

The significance of sustained and definite behavior in the presence of a complicated situation, in preventing or in working off an emotion, may be further illustrated by the following example: An Atlantic liner encounters a fearful storm, and there is great danger

that the vessel may be lost. There are brave men among the passengers as well as among the officers and crew, yet the latter remain calm, while the passengers are on the verge of a panic. The captain on the bridge knows equally as well as the merchant in the cabin what the storm means, but the captain is without emotion, as he firmly issues his orders, while the merchant is so nervous that he cannot follow the hand at cards which he is playing. The difference in the conduct of these two men is to be explained largely by the fact that the officer on the bridge is doing something to help the situation, while the man below deck is helpless. He has no effective mode of action to meet the situation, hence his strong feelings discharge themselves ineffectually and fill him with emotional excitement. If he could do something, he would at once become a brave man. Effective doing usually removes fear. It takes a hero indeed to remain quiet and calm under fire. It is easier to be brave when ordered to charge the enemy even in the cannon's mouth.

Situations suddenly presented may cause emotions. It is important to remember that the situations in which the individual finds himself incapable of any sustained and effective action are almost always those which come upon him suddenly and develop rapidly. He has not had time to prepare for the emergency, to devise plans and think out methods of meeting them. If they had grown up gradually, he would not have been so thoroughly overcome when actually confronted with them.

Emotions may be aroused by imagined situations. It further should be borne in mind that the situation need not be really present, but may exist only in imagination. While in the latter case the emotion is generally weaker than if the conditions for its arousal were present objectively, still it may reach an appreciable intensity. Fear of something that may happen, doubt as to the outcome of a course of events the end of which

is merely imagined, may become very disturbing. Another fact to be kept in mind is that I may not be personally confronted with a situation to be dealt with, but that through imagination I may place myself in the position of some one else and thus experience in sympathy an emotion, although the event does not in any way concern me, and even though I have no personal interest in the individual whom I picture as confronted by the imagined difficulty. Thus through the mechanism of imagination the scope of the emotions may be greatly extended and a person may experience in an imaginary world the situations that call forth emotional experiences.

This fact has important educational implications. "Vicarious" experiences, suggested by history, biography, or imaginative literature, may have almost the force of actual experiences, and the lessons taught in this way may have a directive influence on conduct.

A mood as the residuum of an emotion. *Emotional attitudes; mores.* When the emotion has run its course, there is often left a permanent residue, a long-continued affective coloring to consciousness, that may be designated as a *mood.* This mood may be vague and uncertain as far as its object is concerned, or definite and clear. In the latter instance it may be termed an "emotional attitude" or "prejudice"; that is, a predisposition to act in certain characteristic ways in the presence of an object around which center marked feeling values. Prejudices of this sort are easily found in politics, morality, and religion. When once formed they are extremely difficult to overcome. Emotional attitudes that are common to the members of a social

group are termed by sociologists the *mores* of the group.

Not only may a mood be the result of an emotional upheaval; it may become the starting point of a new expression of the emotion. Fits of anger often leave a tendency to become angry again on the slightest provocation, while a joyous overflowing of spirits leaves a feeling of happiness that again readily finds emotional expression when the least opportunity offers.

Feeling and attention. The affective coloring makes it possible to hold a remote end of action in the mind in the face of immediate inclination. An end of action that had no feeling value could never dominate an individual, and hence sustained attention would be impossible in such cases, and behavior would be reduced to the level of instinct and habit.

I should not have remained at my desk when I heard the music of the circus parade, had not the end toward which I was working been tinged with a strong desire to complete my task. The child in school will not steadfastly pursue a distasteful lesson, except under the influence of some end that he wishes to gain either in the shape of securing a reward or avoiding a punishment or of gaining some end to which the learning is itself an intrinsic means, recognized as such by the learner. Feeling or affection is, therefore, just as important in active as in passive attention; but in active attention the affective coloring attaches to the idea of the end, while in passive attention it attaches to the immediate activity.

It should not be inferred, however, because remote ends of action are held in attention through the pleasurable affective tone accompanying them, that the pleasure as such is the end of the action. Generally the person does not consider definitely whether the

attainment of a desired end will bring pleasure or its opposite. The pleasure is not the purpose of the activity; it is merely the accompaniment of activities or ends which on the whole are desirable.

The boy who is holding in his mind the proposed ball game at the close of school, is not thinking of the pleasure that he is to experience, but of the details of the game. He gets pleasure in imagining these, it is true, but his thoughts are centered in the activity, and are not rehearsing the pleasure as such. It is true that if he did not get pleasure out of the game, he would not continue to play it or to think about it; the activity would not occupy his attention to the exclusion of his studies, nor engage his interests in any way, but this does not mean that he is thinking of the pleasure when his mind is on the game.

The importance of insuring pleasurable outcomes. This distinction between pleasure as the *conscious end* of action and pleasure as the *accompaniment of desirable ends or actions* is important from a practical standpoint. Acts that are to form the basis of desirable habits and behavior that is to be confirmed should be made as pleasurable in their consequences as possible, but little should be said about the pleasure itself. The function of the pleasurable feeling-tone is so to emphasize the *end* of action that it will stand out sharp and clear in consciousness. When this takes place, the behavior will inevitably move in the right direction. On the other hand, if the pleasure of the activity is emphasized as something distinct from the activity, the result is likely to be undesirable. The experience of the individual and of the race emphasizes the fact that pleasure as an end of action when definitely set up and recognized is a veritable will-o'-the-wisp. A striking illustration of this fact is found in later Greek civilization

among the Epicureans. The aim of this school was to do nothing except for the pleasure that could be obtained from it. In the end many found that a life conducted on this principle defeated the very object that it sought, and instead of attaining the greatest pleasure in life, the Epicureans ended in seeking the easiest method of escaping from life through a painless suicide. It is a fact of common experience that the seeker after pleasure soon becomes sated, blasé, and despondent.

Pleasure usually accompanies activities that are habitual or that express instinctive urges. Since pleasure attends those acts that result satisfactorily, that place the individual in desirable relations to his environment, it might be inferred that no act could be pleasurable until its results had finally indicated its desirability. This is, however, not strictly so. *All inborn tendencies or urges, and, in general, all habitual activities, are pleasurable, as far as they have any conscious accompaniment; to repress or "inhibit" these activities causes definite unpleasantness, and when they are "blocked" by external forces an emotional storm may ensue.*

It is to be remembered in this connection, however, that these impulses, as far as they are inborn or instinctive, have come down through generations of inheritance to the present time because on the whole they have proved themselves useful to the race and hence have survived. Therefore it would be in accord with the principle previously set forth to find their expression pleasurable and their repression unpleasant. Habits, in a similar way, may represent forms of behavior that have been valuable in individual development; and

in such cases their pleasant affective coloring is also clearly justified.

The affective element in teaching. One of the most important problems of education concerns the value that should be attached to the affective life, both in its simpler and in its more complex forms.

Until recently there has been a tendency to give feeling but a small place in formal education. The emphasis was placed on intellectual activities, particularly on the acquisition of knowledge. We know, however, that *facts as such have no value in the control of conduct. It is only when they have some worth, when they appear valuable to the individual, that they lead to action.* There must be a glow of feeling, a desire, some form of approval, a resulting attitude, that attaches itself to the mere fact and gives it a sanction and a worth. When the fact itself has no immediate practical significance, its value in reference to other facts that are being taught should be shown. A date in history, as a mere date, has little use, but when its connection with events in which the pupil has an interest is shown, the date becomes significant, it has worth, an actual feeling is attached to it, and it thus becomes of service in further learning. When we come to the larger facts that relate to good government, social integrity, moral uprightness, and the like, facts should never be presented alone. A simple knowledge of the machinery of our government does not make better citizens; information regarding the poverty and degradation of the slums may excite only a morbid interest. The parent in the home, the teacher in the school, and the leader in the social life should all see to it not only that

those whom they would teach are given information, but that in addition to the knowledge imparted there are awakened the elements of feeling that will lead to desired action. Modern educational theory holds that this is best accomplished by linking knowledge with desired action from the outset, hence the emphasis upon a curriculum of "activities" as contrasted with a curriculum comprised only of knowledge-elements.[1]

Summary. In accordance with the various facts emphasized in the foregoing pages, *we may define an emotion as a complex state of consciousness of high affective coloring; appearing under sudden stress in a rapidly developing situation, either actually present or vividly imagined; to which situation adequate adjustment is temporarily blocked; and accompanied by bodily sensations of considerable intensity.* In this statement are embodied the facts: (1) that an emotion always has strong feeling elements; (2) that there is a recognized object toward which the emotion is directed and in the presence of which some activity is demanded; (3) that there is always a difficulty to be faced and that this difficulty is suddenly presented to the individual; (4) that the emotion may be the result of a situation

[1] The emphasis upon "activity" in modern educational theory is largely due to the teachings of John Dewey (born 1859), beyond doubt the most influential educational leader of his generation. In 1900 Dr. Dewey established at the University of Chicago an experimental elementary school in which he demonstrated the educational theories that have since then profoundly affected school practice, not only in this country, but throughout the civilized world. Since 1904 he has been a professor of philosophy in Columbia University. His principal educational writings are: *School and Society, Interest and Effort in Education,* and *Democracy and Education.*

not concretely present but brought up through imagination; (5) and finally that the organic sensations accompanying the emotion are important elements in it.

The feelings which are attached to activities make it possible for us to put forth effort, to disregard the desires of the present moment in order to realize a remote end. It is generally maintained that very turbulent emotions are undesirable because of the accompanying physiological changes which make for wear and tear of the organism, and, also, because they prevent clear thinking. It is probable, however, that even turbulent experiences, because of the energy that they release, may sometimes be positive factors in achievement.

Definitions and Explanations of Terms Used

Emotion. Defined in the preceding summary.

Feeling. An affective state that is pleasant or unpleasant as well as more complex states that are called emotions.

Mood. A relatively permanent state of mind that results from a previous emotional experience, and serves as a predisposition for another emotional outburst. Unlike the emotion, the mood is sustained and consciousness is not in a state of turmoil.

Emotional attitudes; prejudices. Relatively permanent moods sometimes take the form of "emotional attitudes" or "prejudices" which are factors of fundamental importance in education and particularly in social life and in efforts to insure social progress.

Mores. Emotional attitudes or prejudices that are common to all or most of the members of a social

group. (*Mores*, pronounced in two syllables, is the plural of the Latin word, *mos*, meaning custom or manner.)

QUESTIONS AND EXERCISES

1. What is the significance of pleasant or satisfying experiences? Of unpleasant or annoying experiences?

2. What is the effect of pleasantness on the organism? Of unpleasantness?

3. What is the relation of affection or feeling to behavior? Under what conditions should unpleasant experiences be avoided? Under what conditions should such experiences be sought and encouraged? What is the function of pain and suffering in life? Someone has said that pain has been the "schoolmaster of the race"; can you justify this assertion?

4. What are the important differences between the simpler forms of feeling or affection on the one hand and emotion on the other hand? Can you recall from your own experience marked instances of anger, fear, joy, or grief? Can you find an example of an emotion that was not directed toward an object?

5. Give a statement and an illustration of the "James-Lange" theory of emotion.

6. State and illustrate the "emergency theory" of the emotions.

7. Recall the experience of a strong emotion in an actual situation. What caused it to subside? What measures can you suggest for ridding one's self of an emotion?

8. Recall an instance where an imagined situation gave rise to the same emotion discussed in Question 6. In what respects did the emotion differ in the two instances?

9. What is the function of pleasurable outcomes in teaching? List instances from your own school experience or from recent observation in the classroom where the teacher so arranged the situation that behavior which was desirable resulted in pleasurable consequences.

10. What is meant by a mood, and how does it differ from an emotion? (From your own experience compare the mood of happiness that follows from a pronounced emotion of joy with that emotion; or the mood of sorrow with a pronounced emotion of grief.) Can you find instances of alternating emotions or moods — joy with grief, sorrow with happiness, etc.?

11. List some emotional attitudes or prejudices that are important in such phases of social life as religion and politics.

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CHAPTER VI

THE NERVOUS SYSTEM AS THE ORGAN OF BEHAVIOR

In the preceding chapters behavior has been discussed principally from the standpoint of the states of consciousness that go with it, although we have spoken from time to time of certain reflex, instinctive, and habitual activities. In these activities, consciousness is either entirely absent, or, if present, it seems to have little or no directive value. The types of behavior that do not require consciousness for their execution must now be considered — those forms of conduct that occur in a machinelike way and take place with mechanical regularity when the proper conditions are present to bring them about.

A piece of dirt blows into my eye, and immediately the eyelid closes. It is true that I know that a particle is in my eye and that the lid is shut fast. This knowledge does not make me close the lid, however. Consciousness *accompanies* the activity, but does not *direct* it. As long as the particle remains lodged in my eye, the lid will continue to close from time to time, even in spite of my best efforts to keep it open. Again, there are times when I wink my eye and do not know that I am doing it. It is quite evident in this latter instance that the act of winking goes on without conscious control, for there is no consciousness present to direct it. In the former case, however, it is equally true that consciousness does nothing in directing the act of winking. Its presence does not account for the behavior; the winking in both instances is an "involuntary" act.

The nervous system and behavior. Human behavior is controlled by the nervous system and is the direct result of activities going on within this system. To understand behavior it will therefore be necessary to consider briefly some of the most essential facts concerning the spinal cord and the brain. The way in which the nervous system acts may best be understood if we review some of the steps in its development from the lowest forms of animal life up to man.

The simplest type of behavior. In the amœba there is no nervous system. This single-celled bit of living matter, or *protoplasm*, is without any organs whatsoever, yet it takes nourishment, moves about, and reproduces itself, although there are no separate specialized mechanisms for executing these activities. Any part can temporarily serve as a mouth or a stomach; movement is accomplished through a change of form; and reproduction consists merely in the animal's breaking in two and thus duplicating itself.

The amœba not only executes the acts described above; it also responds to stimulation of various kinds. It changes its behavior when affected by lights of different colors, and yet it has no eye to see; it responds to changes in temperature and to electric shock, and yet there are no specialized organs for receiving these excitations. Further than this, there are no muscles whose activity can bring about these changes in behavior. And, finally, there is no specialized device by which the excitation, after it has been received, can be conducted from the point of its reception to some other part of the organism at which an appropriate response to this excitation is made.

Complex behavior requires complicated structures. The more highly organized animals, however, possess sets of specialized cells (different *tissues* making up different *organs*); and each of these sets of cells has a specific function to discharge in the life of the organism. Among these specialized tissues are devices for receiving the excitations that come from the world outside, for conducting these excitations from the point where they are received, and finally for transferring them to the muscles which by their activity produce a response or movement.

In the case of the chick, for example, rays of light from bits of food, grains of sand, and the like fall upon the eye. The stimulation is carried from the eye along the nerves of sight to a central portion of the nervous system, and here the excitation is transferred to nerves leading to certain muscles. The stimulation at length reaches these muscles, which are then set in action, with the result that the chick pecks at the bits of food and the grains before it. The chick has (1) a relatively intricate nervous system with sense organs, such as the eye and the ear, each of which is particularly adapted to receive a special type of stimulation; and (2) various muscles that are affected by the stimulation when it has been carried to them through the nervous system. By their activity these muscles set up certain appropriate forms of behavior.

The simplest form of nervous system. The nervous mechanism in its most simple form serves to join a sense organ with a muscle or set of muscles. The whole is a unit, the various parts acting together. Stimulation is received and transferred to the appro-

priate place for the necessary action to take place. *The nervous system may then be considered as a device for turning the excitations received from the external world and from bodily organs and activities into appropriate responses.* The amœba is capable in a very simple way of responding to such excitations, although it possesses no nervous system. As behavior becomes complicated in the higher forms of animal life, a nervous system puts in its appearance along with other specialized sets of cells. *Complicated behavior and a complicated nervous system go together; where the one exists, the other is sure to be found.*

We may be aided in understanding the workings of the nervous system and the manner in which it has developed, by thinking of it after the analogy of a telephone system. Perhaps telephones are first installed when the town is small, and the instruments are correspondingly few. The connections that can be made are therefore few in number. As the town grows, the number of instruments correspondingly increases and the possible number of connections multiplies. When the town has reached the proportions of a large city, there are many thousand instruments, and an almost limitless number of connections is possible. Also the system of one city may be brought in connection through "long distance" with the systems of other cities, and one subscriber may thus be put in touch with millions of others. In this way parts remotely separated can be brought into almost instant communication.

If we carry our analogy of the telephone system still further, we shall see that, while it is possible for an almost infinite number of connections to be made, such a number is in fact never made. Each subscriber has a limited number of persons whom he ordinarily "calls up," and only in rare instances and under unusual conditions does he call up others; further, there are certain lines that are more often used than are others.

The nervous system may be thought of in like manner. It has various centers, corresponding to the various telephone exchanges

in the various districts of one city and to the exchanges in various cities, all capable of acting when the necessity arises.

The neurone. The most essential part of the nervous system consists of nerve cells technically known as *neurones*. Each neurone is separated from all the others; that is, no two neurones are actually joined together in the sense that one grows into another.

Cell body; axon; dendrite; end-brush. Every neurone has a central portion known as the *cell body* from which grows out a long, threadlike *axon*. The axon is branched at the end, and this branched portion is sometimes called the *end-brush*. It is the discharging portion of the neurone. Sensory neurones pick up stimuli at the end of a branch of the axon which is especially adapted to the particular sense organ with which it is connected. Connecting and motor neurones receive stimulation by means of their *dendrites*. The dendrite is a short, branching extension of the cell body that resembles a thick shrub. Dendrites always receive and never discharge nerve impulses. Sensory neurones have no dendrites.

Classes of neurones. There are three classes of neurones: those that receive a stimulation from a sense organ and conduct it inward are called *sensory* neurones; those that convey a stimulation outward toward a muscle are known as the *motor* neurones; the third class of neurones connect the sensory and motor neurones and are called for this reason *associating* or *connecting* neurones. These three kinds of neurones are not essentially different in structure, although the different kinds of sensory neurones are so constructed as to " pick up " different kinds of excitation, such as

stimuli of light, sound, pressure, temperature, and smell. However, the way in which they act depends largely upon their position in the nervous system. Those that are connected with the organs of sensation are of necessity the ones that receive the incoming excitation, while those that end in the muscles are the parts in the chain that are directly responsible for movement. The associating neurones serve as bridges between the incoming and the outgoing excitations. It must be remembered that *this connection between sensory excitation and motor response is the condition of all experience; that sensation is incomplete without response; and that the nervous system tends always to act in this sensori-motor way.* We shall see later the significance of this fact in our experience and its importance in all learning.

The synapse. As has previously been said, no two neurones grow together. Nerve-impulses or excitations pass from one neurone to another at the point where the end-brush of the axon of one interlaces with the branches of the dendrite of another. This point of contiguity is called the *synapse.* In some respects the synapse is the most important part of the nervous system. It is generally accepted that learning is the result of some change taking place at this junction of end-brush of the axon and the " shrub " of a dendrite. Some physiologists believe that a chemical change takes place when a nerve impulse crosses from one neurone to another; others believe that the nerve impulse from one neurone when it stimulates another neurone to activity causes the dendrite of the latter to extend or to thicken so that it is closer to the end-brush. Exactly what does happen is not known.

The ease with which the nervous excitation passes from one neurone to another at the synapse decides what path it will take. It follows the path of least resistance. If the resistance is great, then the flow of energy is checked in that particular direction and must find other ways of discharge.

Preferred paths of conduction. The ease with which the transmission is made from one neurone to another depends either upon inherited conditions, or upon conditions that develop during the life of the individual. In either case we find preferred paths of conduction; that is, paths along which the excitation tends to flow under ordinary conditions.

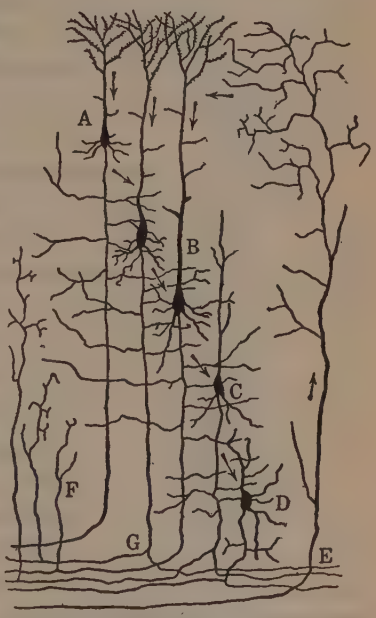

Fig. 3. This figure shows the intricacy of the connections between neurones in the cortex. The thick cell bodies with their processes, the axons and dendrites, are to be observed. (From Barker, *Nervous System*, Fig. 655, after Cajal.)

There are, however, times when the old channels of discharge are no longer adequate, and new paths are formed. The more often the new paths are traversed, the less becomes the resistance at the synapses, and the more likely are the excitations to follow these new paths. This illustrates what some psychologists term the "law of use."

In the nervous system, then, all sorts of neurone combinations theoretically may be made, but not all are

actually made. There are certain preferred or usual paths for the conduction of nervous energy throughout the nervous system, just as there are certain customary connections within a telephone system. Some of these paths of nervous conduction are already in existence in the organism at birth, while others are developed during the life of the organism. The former are inherited, while some of the latter are the result of experience.

The nervous system and its three main divisions. In the higher animals and in man, by far the larger part of these neurones are to be found in the "central nervous system," which comprises the brain and the spinal cord. Outside the central nervous system are to be found collections of nervous elements which together make up what is known as the *autonomic* or *sympathetic* nervous system. In addition to the central and sympathetic nervous system, there are the nerves which carry excitations from the sense organs inward and from the central and sympathetic system outward to the muscles and the glands. These *afferent* and *efferent* nerve trunks are sometimes spoken of as comprising the *peripheral* nervous system.

The central nervous system: the spinal cord, the medulla, and the brain. In man and the higher animals the general appearance of the central nervous system is practically the same. At the top of the spinal cord which is incased within the backbone there is a budding out into the *medulla*, and above this is the great mass of nervous substance contained within the skull and called collectively the *brain*. This has many different parts, but only a few of the most impor-

tant can be mentioned here. The larger part of the brain consists of the *cerebrum*, divided into *hemispheres*, and showing on the surface folds and fissures. At the back and below the cerebrum is a smaller mass of nervous substance that is called the *cerebellum*, or "little brain."

Within this central nervous system are to be found millions of separate neurones, apparently mingled together in the greatest confusion, but nevertheless under normal conditions working in perfect harmony and leading to behavior that is definite and well-ordered. The confusion, then, is apparent, not real. This wonderful organization that produces harmony among so great a number of parts is due, as has already been pointed out, to two facts: (1) in the intricate windings of the nervous elements there are certain definite connections that are inborn; and (2) many other connections are gradually formed and made relatively permanent after the individual has passed beyond the period of embryonic or prenatal development and has entered upon life as a separate organism.

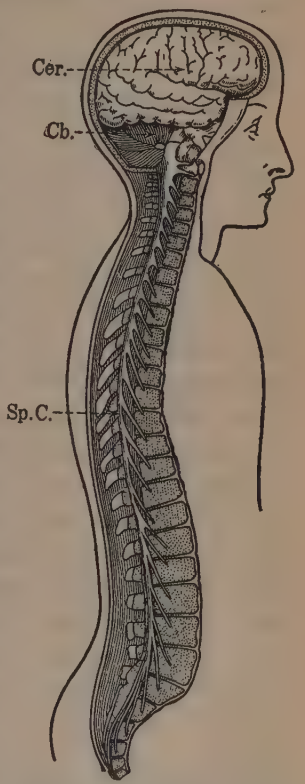

Fig. 4. Lateral view of the nervous system. Cer, **the cerebrum;** Cb, **the cerebellum;** Sp. C., **the spinal cord.** (From Angell, *Psychology*, Fig. 12.)

The functions of the central nervous system. (1) *The cord.* The various parts of the nervous system show a certain degree of specialization; that is, they do not all perform exactly the same kind of work.

The spinal cord is the great channel of communication between lower centers and those higher up. There are ascending and descending bundles of nerve fibers, each the prolonged axons of a neurone. Through the ascending bundles or *tracts*, excitations, arising from the sense organs in the skin and various internal organs, reach the cerebrum, where the excitations are related to certain specific sensations and where in turn excitations may be sent out to various muscles through the descending tracts. If the cord is seriously injured, these sensations are no longer possible, and the activity of those muscles lying below the point of injury ceases; in other words, paralysis results. It is as if the wires in a part of the telephone system had been cut, so that no communication could be received at the central office and no messages could be sent out. There may also be a paralysis of certain voluntary muscles due to an injury or lesion in some part of the brain substance itself. In this case, the trouble lies, so to speak, in the "central office."

However, there are nerve tracts that enter the brain at its base, known as the *cranial nerves*, and these do not pass through the cord. Hence such nerves would be unaffected by an injury to the cord, and these could still carry the ingoing excitations and send out the response to the muscles with which they are connected just as if nothing had happened. So an individual with an injured cord might not be aware of a touch on the hand or the prick of a pin on the leg, might be unable to move his limbs, and still be able to see and hear and move the muscles of his eyes and face in the usual way.

The sensory nerve-tracts from the eye and the ear enter the central nervous system above the spinal cord, and the motor nerve-tracts leading to the facial muscles leave the central nervous system above the spinal cord.

The cord not only conveys excitations to centers lying higher up; it not only carries excitations from the higher motor centers to various muscles; it can act to a degree independently of these higher centers. It can immediately transmit a sensory impulse to a motor neurone or a number of these, and behavior can result without the brain taking any part in this behavior. In other words, there are connecting neurones in the cord itself. This transmission may be between neurones at the same level in the cord, or between a neurone at one level and a neurone at another lying higher up, or still again between a neurone lying on one side of the cord and a neurone lying on the opposite side. The most simple instance of transfer is when the discharge passes from one neurone to another at the same level and on the same side of the cord, thus involving the activity of but two neurones. Usually the relation is much more complex than this. Between the top of the cord and the cell bodies lying near the surface of the cerebrum, and constituting the *cortex*, there are to be found transfers of a much more elaborate and complex character, but still essentially like the simpler transfers lower down.

(2) *The cerebral cortex.* The most intricate of these transfers or " coördinations " is in the cerebral cortex itself, the most highly organized portion of all the nervous structure, and the last to develop in the race and in the individual. The *cortex* is the outer structure

or " bark " of the cerebrum. It is made up of a vast number of cell bodies or neurones. The axons of these cortical neurones, each covered by a white sheath which apparently acts as an insulator, form a large part of the internal *white* matter of the cerebrum. The cortex itself has a grayish appearance when seen in cross section; the inner substance is white due to the white sheaths of the axons.

Certain parts of the cerebral cortex are chiefly concerned in the reception of sensory excitations that arise in the external world, while others direct the proper response of the muscles. The former are known as *sensory areas* and the latter as *motor areas*.

The sensory areas that are marked out with considerable definiteness are those concerned with sight and hearing. The motor region in the cortex not only sends out impulses to the muscles, but also receives excitations due to the activity of these muscles, and thus we become conscious of this activity, although we may not see the movements that are made. For this reason we can walk or write with our eyes closed.

Certain parts of the cortex do not seem to represent definite sensory or motor areas; it is believed that these parts are chiefly concerned in connecting other parts. These regions are consequently known as the *association areas*, and they are supposed to be intimately connected with the higher thought processes. In man, they constitute nearly two thirds of the cortical area.

Consciousness correlated with cortical activity. Whether consciousness is connected with all the activities of the nervous system or not is a question not easy to answer, but it has been proved that the more

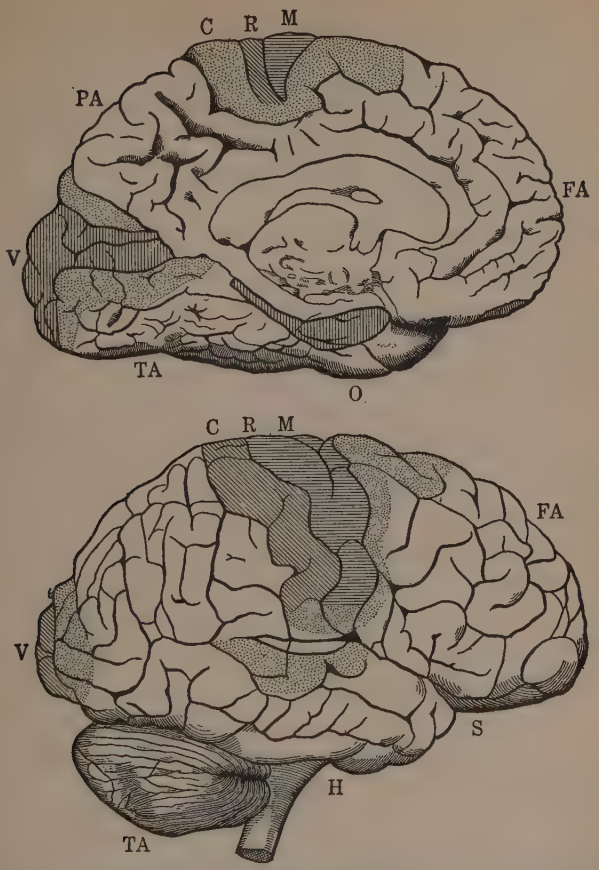

Fig. 5. Localization of function in the cerebral cortex. The upper figure shows the mesial surface of the left hemisphere of the brain; the lower, the outer surface of the right hemisphere. The motor areas are indicated by horizontal shading; the sensory areas, by vertical shading; the association areas remain unshaded. The areas containing dots are either partially sensory or motor in their function, or doubtful. The auditory area lies above H; V marks the visual area; M is above the motor area; FA marks the frontal, PA the parietal, and TA the temporal association areas. (From Pillsbury, *Essentials of Psychology*, Fig. 7.)

highly developed forms of consciousness are in some way related to the activities of the cerebral cortex. In man these higher activities take on such importance, and the consciousness accompanying them is so complex, that all more simple and rudimentary forms of consciousness would be necessarily obscured even if such forms existed.

Facilitation and inhibition. Up to this point we have considered the nervous system as a means for receiving excitations, associating them, and transferring them into muscular or glandular responses. While this is the general purpose of nervous activity, it does not follow that every excitation immediately issues in action. In the lower centers, under normal conditions, stimulation and positive response are joined in an invariable sequence. The higher centers, however, not only *facilitate* response; at times they *check* response. Here we observe the phenomena of inhibition, repression, and control that characterize the higher intellectual activities. It is a well-known fact that yielding to every impulse, distraction, and whim is an indication of a weak or undeveloped mind. Deliberation and decision mean that there must be a check on hasty and uncontrolled behavior. The lower centers, if left to themselves, respond to their customary excitations in definite and unvarying ways. They may act to a purpose, but in a quite irrational way. The cortical neurones exercise a control over the activities of the lower lying neurones and serve to check their activity when the necessity arises.

The functions of the sympathetic or autonomic nervous system. The neurones of this system lie

outside the central nervous system but they are subject to nerve impulses from it. They have a close relation to the physiological changes which come about during the expression of emotion as described in the James-Lange theory. The autonomic system controls the glands and the muscles of the visceral organs. The endocrine glands are believed to have a profound effect upon behavior, although just what the effects are in each case and how to control glandular secretion is a field for further study. Apparently the most important of the endocrine glands are the thyroid, the pituitary, the adrenals, and the sex glands.

Summary. Human behavior is controlled by the nervous system. The nervous system is made up of neurones which transmit nerve impulses. There are three kinds of neurones: sensory, motor, and associating. Sensory neurones convey the nerve impulse from the sense organs to the central nervous system. Motor neurones convey nerve impulses from the central nervous system to the muscles. Associating neurones serve as bridges between the incoming and the outgoing excitations. It is believed that learning is the result of something that takes place at the synapses where the axons of neurones come into close proximity with branching dendrites of other neurones. There are certain preferred paths for the conduction of nerve impulses, some of which are inborn while others are acquired through experience.

The central nervous system consists of the spinal cord and the brain. From the point of view of consciously controlled behavior, the most important part of the brain is the cerebrum and the most important

part of the cerebrum is its *cortex* — a "rind" or "bark" composed largely of the cell bodies of neurones. For the most part the functions of the spinal cord are less complex than those of the cerebral cortex. Cortical activity makes it possible to facilitate or to inhibit many types of response, thereby controlling those phases of behavior that are not entirely automatic. The autonomic nervous system, lying outside the central nervous system but influenced by it, controls glandular functions which are believed to have profound effects upon behavior and controls also the muscles of the visceral organs.

Definitions and Explanations of Terms Used

Preferred paths of conduction. Definitely established connections in the nervous system along which excitations flow readily.

Neurone. A nerve cell, the unit of the nervous system. It is estimated that there are about eleven thousand million neurones in the nervous system of a human being.

Cell body. The vital, fuel-containing portion of the neurone.

Axon. A long, threadlike growth, sometimes several feet long, constituting the typical nerve fiber which conducts the nerve impulse away from the cell body.

End-brush. The branching, discharging termination of an axon.

Dendrite. The shorter extension of the cell body resembling in appearance a thick shrub which receives the nerve impulse from the end-brush of another neurone.

Synapse. The area where the end-brush of one

neurone comes into close enough proximity to the dendrite of another neurone to permit the passage of the nerve impulse from one neurone to another.

Sensory neurones. Those receiving the stimulation from the receptors in the sense organs and conveying the nerve impulse toward the central nervous system.

Motor neurones. Those conveying the nerve impulse from the central nervous system to the muscles.

Associating neurones. Those transmitting the nerve impulse from sensory to motor neurones, or connecting other associating neurones.

Central nervous system. This includes the spinal cord, the medulla, and the brain.

Cerebral cortex. The outer part of the cerebrum consisting of a layer of nerve cells. This is the most important part of the nervous system, as far as its connection with consciousness is concerned.

Facilitation. An activity of the higher nerve centers in the nervous system which aids, reinforces, and abets some of the activities of the lower centers.

Inhibition. An activity of the higher nerve centers which checks, represses, and holds in control some of the activities of the lower centers.

Autonomic nervous system. Nerve elements lying outside the central nervous system which control the activity of glands and of the muscles of the visceral organs — activities which are probably responsible for the " feeling tone " of the organism.

QUESTIONS AND EXERCISES

1. What is the function of the nervous system as a whole?

2. Compare the simplest form of nervous system with that of a human adult.

3. Describe a typical neurone, naming its three parts. How are the excitations transferred from one neurone to another?

4. Name three classes of neurones. Which contains the largest number? What is the function of each?

5. What is a synapse? How is it related to learning?

6. What do you understand by the term "central nervous system"? What are its chief divisions, and what is the function of each?

7. What is meant by the cerebral cortex? What reasons can you give for believing that the cerebral cortex is the part of the brain that is chiefly concerned with "conscious" activities such as sensation, perception, memory, thought, etc.?

8. What is meant by facilitation? By inhibition? How does the cortex exercise inhibition on the movements otherwise controlled by the lower centers?

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CHAPTER VII

NATIVE TENDENCIES AND BEHAVIOR

The description of the structure and activity of the nervous system set forth in the preceding chapter will enable the reader to understand better the various types of behavior that are directed by nervous activity with little or no consciousness involved.

Reflex behavior. In Chapter I we spoke of reflex behavior and gave as an example of this the action of the eye when light of different degrees of intensity affects that organ. When the illumination is intense, the size of the pupil is small; when it is weak, the pupil grows large. In this case the excitation, due to the light acting upon the eye, is carried along sensory nerves to certain centers where it is directly carried over to motor neurones that send their discharge to the muscles which control the size of the pupil. In this case, stimulation results directly in a definite motor response. There is no intervention of consciousness in any way, and the whole activity is the result of certain definite inherited neurone connections. The course of the nervous stimulation and discharge is fixed during the period before birth and is fully marked out at birth.

Another reflex activity that has been discussed is that of winking. Here, as in the case of the reflex mechanism of the pupil of the eye, the activity is due to the fact that there is an inherited connection between

the sensory excitation and the motor response to this excitation.

Numerous other examples of reflex activity might be cited, such as coughing, sneezing, swallowing, and sucking. They are all to be explained in the same way — namely, in terms of inherited paths of preferred conduction or inborn connections between stimulation and response. The ease with which the stimulation traverses the nervous system from its beginning in the sense organs to its end in the muscles is believed to be conditioned largely by the openness of certain of these paths at the synapses. When the discharge of nervous energy is facilitated at these points of contact between the neurones, then the whole process is direct and certain, and the activity is carried over from the sensory to the motor neurones without difficulty.

Instinctive tendencies. Man has innate or inborn impulses which cause him to react in more or less definite ways to more or less definite stimuli. These innate impulses which all human beings possess are called instinctive tendencies. The reactions which these tendencies call forth are less definite and more modifiable than reflex activity. It is believed, however, that the tendency to react to certain stimuli with one type of response rather than its opposite can never be completely eradicated. For example, if one's bodily movements are hampered one tends instinctively to be annoyed rather than pleased, and to make avoiding rather than seeking responses. The responses actually made may depend upon experience, but the tendencies to be annoyed and to avoid are instinctive. The difference between reflex and instinctive activity is a

difference of degree rather than a difference of kind. Activity which results from instinctive tendencies, however, is accompanied by feeling, a conscious state, while reflex activity may have no conscious accompaniment.

Instincts of animals and instinctive tendencies of man. The long period of human infancy helps to explain an important difference between man and the lower animals. Many of the lower animals almost from the outset can move about, find their own food, combat their enemies, and propagate their species. This means that they come into the world with nerve connections already fixed which enable them to carry out complex acts without going through a period of training or learning. These inborn connections are the physiological basis of "instincts" as these are manifested in the lower animals. For our purposes an instinct may be defined as a relatively complex type of behavior for which fixed and definite nerve connections are provided by physical heredity.

The behavior of most animals below man is almost entirely governed by these inherited "controls," and this behavior tends to remain relatively unchanged from generation to generation. The human infant, on the other hand, has very few of these definite and perfected nerve connections fixed at birth. He can breathe and take food and cry; but he cannot control to any marked degree the movements of trunk and limbs. This is one of the disadvantages of being born a human being, but this temporary disadvantage is offset in an overwhelming measure by the advantage of plasticity. Not being burdened with fixed and unchangeable modes of behavior, the human infant is in a position to learn

or acquire the modes of behavior that best meet the conditions under which he will live.

There has been a lively controversy among psychologists as to whether the human infant possesses more or fewer instincts than do the lower animals. If we define an instinct as a complex type of behavior for which completely fixed and definite nerve connections are provided by physical heredity, it is clear that the instinctive equipment of the human infant is very meager indeed; but if we were to conclude that the human infant has few inborn *tendencies* to act in somewhat definite ways we should probably be mistaken. For this reason it is well to distinguish between the fixed and definite *instincts* of the lower animals, and the innate (or inborn or instinctive) *tendencies or urges* of man. The latter are just as much the product of physical heredity as are the former, but they differ in being less definite and much more readily modified by training.

The advantage of a long period of infancy. This may possibly be explained by reference to the lengthened period of infancy in the human species. In all probability, the very remote ancestors of man had full-fledged instincts comparable with those of the lower animals. As infancy became prolonged, it may well have come about that the human offspring came into the world with fewer and fewer of the nerve connections firmly fixed. With most of these connections it is probable that only the initial stages of development are perfected at birth. Most of the instincts have become, as it were, truncated. Something innate is there, but it expresses itself as a *tendency to act, an urge to act,* and not as a perfected movement.

Classification of instinctive tendencies. Psychologists differ widely in regard to the whole problem of instincts. However, all psychologists agree that human beings possess certain unlearned, innate (or inborn) tendencies to be annoyed by certain stimuli and pleased by other stimuli and to react to them accordingly. Disagreement arises when the specific responses which the instinctive tendencies call out are termed instincts. The more specific the responses are that are called instincts, the longer the list becomes. Some psychologists include under one name many instincts listed separately by other authors. Some recognize rivalry, for example, as expressing an instinctive tendency to compete. Others include rivalry as an expression of the instinctive tendency to assert one's self. Still others speak of the instinctive tendency to master and include rivalry under mastery. In this chapter we shall try to group instinctive tendencies according to their relationships to the processes of education.

The adaptive tendencies. Curiosity leads the child to pry into the world about him. He will take to pieces the mechanical toy that he is playing with, not because he recognizes that he may learn something that will be of benefit to him later, but for the pure delight of finding out how it works — of satisfying his curiosity. This is useful in adapting him to the life that he must live — for some of the gains that man has made have been crystallized in utensils, implements, machines, and other devices. The curiosity of the child enables him to gain some knowlege of these far in advance of any immediate need for using them. And besides this, there is the great world of natural objects many of which he must

know and recognize, and here, too, curiosity is of great service.

Play has also been referred to as a response to an instinctive tendency and the theory of Karl Groos regarding play (p. 32) definitely ascribes to it an adaptive function. The delight that the child takes in activity simply for the sake of activity gives him control over his muscles. He learns how to make different movements, and how to put different elements of movement together to make new combinations — to *coördinate* movements, as the process is called.

What is true of curiosity and play is likewise true of the other adaptive tendencies. The squirrel collects nuts for the coming winter, although it does not need them at present and certainly in the first season of such activities it has no knowledge of their value in meeting future needs. A similar instinct prompts the bee to gather nectar although we cannot conceive of the insect's having an idea that this will be of use at some future time. In like manner, the native tendencies of the human being prepare him for a future that he cannot foresee. The collecting and hoarding tendency in the child has not so direct a value as it has in the cases of the animals above cited; nevertheless, by means of making these collections the child may learn much that will be useful to him later. Like play, too, the tendency to collect may be used by the teacher as a means of indirect instruction. The collection of stamps and coins, for example, may awaken an interest in and give a certain acquaintance with foreign countries and thus serve as a valuable aid in the study of geography and history; the gathering and preserving

of various flowers and insects may be of help in nature study, and so on.

The constructive tendency is clearly of great value to the individual, and may be made of service in education. It explains in part the interest that most pupils show in manual training, and in cooking, sewing, and other domestic arts.

The individualistic tendencies. This name is given to a group of instinctive tendencies because the activities which they call forth make for the preservation and welfare of the individual and often come into conflict with the welfare of others. Prominent among these are the tendencies to fight, to bully, to tease, and in general to prove one's superiority over others. Combativeness, or the tendency to fight, has less value in present-day civilization than it possessed in the past. A calm attitude, a lack of emotion, a calculating coolness, belong more to modern society than they did to the savagery of the past. Further, when there were few recognized laws and no means of enforcing them, existence depended largely on the ability and the will to fight. Combativeness was an essential in the struggle to survive, and the fighting tendency was indispensable.

The self-assertive tendencies also lead to display, domineering, and other activities which, under primitive conditions, tended to excite in others "self-abasement." This is called the tendency to mastery by many psychologists. Properly directed it impels one to persevere in difficult undertakings and is thus responsible for much of the progress that mankind has made.

The sex and parental tendencies. The sex and parental impulses are, next to self-protection, the most

fundamental and imperious of the instinctive tendencies. Indeed, parental behavior may negate all other forms, and impel the individual to sacrifice even life itself for the sake of the offspring. The instinctive tendency which calls forth sex behavior is the basis of conjugal love; that which calls forth parental behavior is the basis of parental love. The sex impulse is one of the most important of all the instinctive tendencies, although it has somewhat less educational significance than many of the others. The great value of this instinct is to be found in the fact that it is responsible for the propagation of the species. It is useful in the education of the mature individual, but plays a less important part in the education of young children.

The parental instinctive tendency is at the basis of the care and protection of young children. Parental love develops and endures chiefly because of the long period of infancy and the helplessness of the young of human beings. The wise teacher will bear in mind that this tendency is ever present in the parents of his or her pupils, and will take it into consideration when discussing the behavior of pupils with their parents.

The social tendencies. A fourth class of fundamental tendencies is given the designation "social." It includes rivalry or competition; that is, the tendency to vie with others for the possession of a desired object, whether a material object, such as food, or an immaterial object, such as leadership or fame or popularity. Competition has sometimes been thought of as something base and unworthy. It is maintained by some that it is this spirit that fills our reformatories and prisons. This point of view is so radical that it

carries with it its own refutation. Competition is not bad in itself; like everything else it may become an evil if carried to an extreme. Competition among civilized human beings does not necessarily nor generally mean a bitter hand-to-hand struggle for existence, in which the weak are ruthlessly pushed aside and left to perish. It means rather a more or less conscious attempt on the part of the individual to achieve certain ends that have been set up as social ideals. Of necessity it is true that in the striving for these ends some will outstrip others in the race; some will arrive at the goal, or at least get reasonably near it, while others will be left far behind; and the force of rivalry in life depends upon this primitive factor. Rivalry, like fighting, must be modified if it is to be thoroughly serviceable under the conditions of civilized life.

Another of the social tendencies is the tendency to congregate in groups — to be gregarious. It manifests itself, often in a very marked manner, in the herding of lower animals. In man, an instinctive gregarious tendency is probably the basis of the important feeling of sociability — the delight in human companionship — common to all normal human beings. Children at a very early age seek and enjoy the companionship of other children. One of the greatest misfortunes that can befall a child is to be left entirely or even largely in the society of adults. The lonely child deprived of actual playmates not infrequently creates imaginary companions with whom he plays in fancy, and thus attempts to make up in this unreal manner for the vital lack of actual associates. The young person and the adult, like the child, are social beings, and bereft

of society, they are generally wretched. There is no punishment so severe as that of solitary confinement, and the danger of mental derangement among individuals marooned on lonely islands or otherwise completely isolated from their kind has long been recognized.

All education must begin with instinctive tendencies. Education must always start with instinctive tendencies, but man to be man must get beyond them. The behavior that is distinctively human is the kind that has been changed to suit the stage of development that the race has reached. We have just shown that certain innate tendencies have a useful part to play in civilized life. Some of these — for example, play, curiosity, and constructiveness — lead the individual to modify his behavior for himself — that is, without the aid of a guide or a teacher. The task of education here is to give these adaptive tendencies a chance to operate in a helpful way — to provide space and companionship and leaders for healthful plays; to give curiosity something to pry into and explore that will yield valuable knowledge; to give the constructive impulse objects to work upon.

Beyond the instinctive tendencies that are useful in their original form, however, there are others that must be changed or transformed.

The modification of instinctive tendencies. (*a*) *The attachment of another feeling with its appropriate response to an object that naturally arouses an undesirable impulse.* This is the simplest method of modifying an instinctive tendency, and is in fact the only one that can be effectively employed in the training of animals and in the earliest stages of the child's education. The most

common form that this method takes is that of physical punishment. The efficiency of physical punishment lies in the fact that the annoyance and the movement of retraction or flight are associated with an object that would *naturally* arouse satisfaction and a seeking movement. Thus the child must learn under what conditions he may or may not exercise his acquisitive tendency. Nature tells him to appropriate any object that pleases him; but civilized society is possible only when one respects the property rights of others. We cannot in this world appropriate every object that pleases us. We must learn when to check or inhibit this tendency, and to learn this thoroughly means beginning very early in life to distinguish between the objects that one may take and those that one must leave. Thus when the child appropriates a forbidden object, the careful parent sees to it that the act results unpleasantly. In the course of time — perhaps even after the first disastrous experience — the object that originally stimulated the desire for possession now stimulates the tendency to withdraw or retract, and the feeling of annoyance.

This may be clearly observed in children during the second year of life. The child will touch and play with some objects freely. In his attitude toward others you will often note an initial reaching movement; then the hand falls back, and perhaps the child withdraws from the neighborhood of the object. In the course of time, the actual advance and withdrawal cease. *Inhibition has become a habit* with reference to this particular object; the temptation is no longer felt; the primitive impulse has been effectively modified.

This conquering of instinctive tendencies or native urges probably requires no image of the first disastrous

experience. No judgment is necessary; the child does not say to himself, "I took this object before, and was punished; now I will leave it alone." The unpleasant feeling *immediately* colors the perception of the object, just as, before correction, a pleasant feeling was a part of the immediate perception.

The reader may find examples of this immediate fusion of the unpleasant experience with its object by recalling the way in which he looks upon some article of food which, through overindulgence or for some other reason, has caused nausea. For some time afterward, one does not like to see the article in question, for the unpleasant feeling is immediately fused with the perception.

The significance of the unpleasant in moral training. It is difficult to overestimate, in connection with the problem of moral training, the importance of this fundamental method of modifying instinctive tendencies. *Moral culture consists primarily in shifting the emphasis which nature has placed upon certain acts and activities.* Although feelings of disgust and repulsion no longer need to be attached to certain objects that were dangerous in primitive life, we *do* need to attach them to certain tendencies that may have been very important in primitive life but which, through the course of social evolution, have acquired quite the opposite significance.

This suggests the importance of thus modifying undesirable tendencies very early in the child's life. Unless unsocial tendencies bring unpleasant consequences, they are bound to become confirmed, and the difficulty of eliminating them is increased tenfold. The years of early childhood in the home, and the first five or six years of the child's school life, are fundamentally significant in this connection. One cannot solve all of the problems of moral education in the preadolescent period, but if the basis is properly laid at

this time, the later problems will be greatly simplified. The child who has had a proper training in these formative years will evince a strong prejudice against lying, theft, laziness, and physical uncleanliness. He may not *know why* these things are wrong, but he will *feel* that they *are* wrong, and this is the fundamental and important factor; for conduct is at basis a matter of feeling, and those in whom antisocial activities arouse disgust and abhorrence may be safely trusted to pass through the later emotional and moral crises in comparative safety. This problem will reappear in Chapter XVI.

The doctrine of natural punishments. A great many misleading statements have been made by writers upon the subject of child discipline. Some have maintained that "nature" will look after the necessary corrections — will associate unpleasant consequences with wrong acts and pleasant consequences with right acts. Leave the child to the operation of the environment about him, these theorists maintain, and he will acquire the kinds of acts that are valuable, and discard those that are useless or harmful. One form of this doctrine is known as the theory of "natural punishments" and was elaborated in a very ingenious way by Herbert Spencer, with whose name it is commonly associated. The doctrine has many points to commend it, for it is true that the child, in adjusting himself to the world about him, will learn to inhibit many tendencies that do not fit in with present-day conditions. This method of learning, however, should not be depended upon alone. It is really a process of trial and error, and like all such processes is cumbrous and uneconomical. (See p. 22.) Conscious correction by parent and teacher proceeds upon the basis of intelligence and foresight, and saves the child from undergoing too many painful experiences by seeing to it that the pain comes

at the proper time and is clearly associated with the undesirable act or impulse.

The natural method of punishing the child for a careless use of matches would be a painful burn. But the careful parent will spare the child this experience by associating the handling of matches at an irresponsible age with an unpleasant consequence sufficiently strong to inhibit the tendency, but far from being either so painful or so dangerous as an actual burn.

Pleasure vs. *unpleasantness in learning.* Still other educational writers (and not a few parents and teachers) believe that the child may learn the necessary inhibitions of life without experiencing unpleasant consequences. They would always reward the good rather than punish the evil. Again, there is much to be said for this point of view, and one would be foolish, indeed, to withhold the pleasure that ought to attach to right doing. But the doctrine has certain limitations and dangers that need to be held very clearly in mind:

(1) In the first place, annoyance is probably a more effective stimulus than satisfaction. This is true in animal psychology, as has been abundantly demonstrated. There is no doubt that it also holds with children and indeed, with adults. This does not mean, however, that the two should not work together, or that the pleasant sanctions should not always be used when it is clear that they will be effective.

(2) Another reason for not entirely discarding the unpleasant lies in the fact that the kinds of behavior that are most significant and important in social life are, in some instances, far removed from instinctive tendencies or urges; consequently it is difficult always to find naturally or instinctively pleasant objects with

which to associate these socially important activities. The finest things in life are its generosities, its sacrifices, its renunciations, its achievements that have come after persistent effort and struggle; and all of these things — these greatest "goods" of life — have but a restricted "natural" sanction. Sacrifice, for example, seems to be an instinctive urge only in connection with the protection and care of offspring, and even then in a pronounced form only in the mother. Achievement may have a primitive basis in the powerful impulses of combativeness and rivalry, but *persistent* effort — effort continued for a long time against tremendous odds, and in the face of contrary desires that are keen and imperative — is an art that strikes against the most fundamental of the natural tendencies and urges.

The modification of instinctive tendencies. (*b*) *The attachment of another response to an object and to the feeling that the object naturally arouses.* This is also a simple method of modifying an instinctive tendency. The urge to fight furnishes a good example. It is *naturally* aroused only by some gross invasion of one's own physical rights, and it is *naturally* expressed only by actual physical combat. If I ruthlessly take from the little child the object which he has appropriated and in which he finds pleasure, he will strike, kick, bite, look ferocious, and emit, not the cry of pain, but the cry of rage. This is the normal expression of the fighting tendency aroused by a normal stimulus. Primitive man similarly responds to a similar situation. Civilized life, however, compels another mode of response. If my neighbor steals my fruit, I cannot well keep from resenting the act keenly; it would not be

well for social life that feelings of resentment should be repressed when personal rights are invaded, for this would encourage an exploitation of the decent and law-abiding by the lawless. On the other hand, while I *feel* the resentment, *I must not express that resentment in the primitive fashion.* I must seek satisfaction, not with my fists, my teeth, and my nails, but through a due and proper process of law. Thus civilized society, while sanctioning the attachment of a primitive feeling to a primitive stimulus often demands a quite different response.

Educationally, this method is important in connection with most of the individualistic tendencies, with some of the adaptive tendencies, and especially with the sex tendencies. It is right that rivalry should stimulate the feeling of emulation, for in this way progress is assured through many members of the group. One individual achieves an advance over his fellows, and his fellows struggle to catch up with him. This is "good," for it tends to advance the entire group. But rivalry can easily be expressed in ways which are "natural" enough but which are, nevertheless, quite inconsistent with social welfare. It is "natural" to take an unfair advantage; primitive man had no standards of honor in combat. Civilized man has established such standards — standards that have been wrought out of the race experience through centuries of struggle and suffering. The child must be taught to live in accordance with their dictates. He must be led to feel that cheating, deception, "hitting below the belt," talebearing, and "knocking" are dishonorable and forbidden means of rivalry. He must learn to "play the

game" fairly and squarely and to prefer honorable defeat to a dishonorable victory; and he must generalize these standards of conduct beyond the athletic situation, and apply them to every situation in which he competes with his fellows.

It is for this reason that supervision of the games and plays of childhood is imperative; for these activities, unsupervised, are likely to confirm and sanction underhanded means of winning. It is true that the cheat may be detected, and it is true that under certain conditions a much more effective punishment will be meted out to him by his fellows than the cleverest supervisor could devise. But these conditions do not always govern the situation. If the cheat happens to have the qualities of leadership, he will infect with his virus a goodly following among his companions; and the evil, which is bad enough when individually expressed, runs riot through the entire social group.

The modification of instinctive tendencies. (*c*) *The detachment of a feeling from its natural object and response, and its attachment to other objects and responses.* Much more difficult than either of the methods of modifying instincts discussed above is the method which attempts to lift a strong feeling bodily out of the instinct to which it naturally belongs and to fasten it firmly to another object and to an entirely different response. This process, emphasized by McDougall,[1] is sometimes called the *sublimation* of the instinct, and its impor-

[1] William McDougall (born 1871) presents an important theory emphasizing the instinctive basis of the emotions in his *Social Psychology*. Many elements of this theory have been drawn upon in preparing the present chapter. Dr. McDougall was born in England and spent the earlier part of his professional life in the University of Oxford. In 1920 he became professor of psychology in Harvard University, and later accepted a similar chair in Duke University, North Carolina.

tance lies in the possibility of thus enlisting in the service of an important social ideal the powerful force that the native feeling respresents and the energy that it may set free.

This is what has happened, for example, when we "stand up for what is right," "fight for a principle," "make war on evil," and do other strenuous deeds which we can adequately describe only by employing a militant metaphor. The "cause" for which we "fight" becomes in effect a part of our own personality. We have appropriated it; *it is ours*. Hence the feelings and emotions that naturally go with the fighting urge or impulse come to attach to the cause that we have made our own if this cause is invaded, questioned, or made light of by others. But, while the feeling of resentment is aroused by the invasion of our cause, the primitive method of expressing this feeling must not be permitted to operate. On the side of response as well as upon the side of the object or stimulus, there must be a modification.

A very good illustration of an effective attempt to sublimate a primitive instinct is to be found in the success of the Salvation Army. Here we see a military organization with innumerable suggestions of actual physical combat enlisted in the service of the most peaceable of ideals. The Boy Scout movement makes a similar use of the feelings connected with several of the primitive tendencies, attaching them to other objects and insuring responses that are only *symbolic* of the actual primitive responses.

In general it may be concluded that these concrete and tangible factors that hark back in a symbolic way to an older instinctive tendency will be of inestimable service in enlisting in a worthy cause the feeling origi-

nally attaching to the impulse. Fortunately for us, nature did not draw fine distinctions, and when she associated feelings and emotions with innate activities, it was usually by very superficial bonds. These were sufficient for her purposes, and the very superficiality serves us a useful turn now that civilized life has compelled a reconstruction of so many of our native tendencies.

Modified behavior patterns of the three types just discussed are sometimes spoken of as *conditioned* responses. Watson [1] holds that all behavior consists of reflexes and conditioned responses.

The relation of attention to the modification of instincts. We have discussed three general methods of modifying instinctive tendencies. In these, the principles that were developed in the chapter on attention are important. It will be remembered that primary passive attention was at that time termed instinctive; attention is *naturally* given to those stimuli that fit in with instinctive or inborn tendencies. On the other hand, active attention means attending by effort to something that is not attractive, that does not fit in with an immediate instinctive need or urge. The early stages of active attention represent a modification of instinctive behavior; it is only because we can give active or effortful attention that we can get above primitive tendencies and climb to the plane of civilized life. In the chapter on Attention, we emphasized the impor-

[1] John Broadus Watson (born 1878) was professor of experimental and comparative psychology at Johns Hopkins University from 1908 to 1920. He is recognized as the leading exponent of the behavioristic or mechanistic school of psychology. His best-known books are *Psychology from the Standpoint of the Behaviorist,* and *Behaviorism.*

tance of holding in mind the remote end as a means of overcoming the tendency to follow immediate desire. In the chapter on Feeling it was pointed out that the only way in which the idea of a remote end can be made effective over behavior is *to endow it with a feeling that will conquer the feeling attached to the immediate tendency*. In other words, we really place the gratification of the desire *in the future* and work steadfastly toward that instead of following the behest of *immediate* desire.

Ideals in relation to instincts. This attachment of a strong feeling to the idea of an end to be attained turns the *idea* into an *ideal*. The ideal may be closely related to an instinctive tendency, as when the boy who does not like to sell newspapers — who fears the taunts of his competitors, or the rude refusals of those whom he approaches as customers — conquers his shyness by the ideal of earning money — of gratifying the instinctive tendency of acquisition. Another ideal that works close to the instinctive level is represented by the boy who dislikes arithmetic, but who works at his problems in spite of his distaste for them, because when he finishes them, he may gratify his constructive impulses at the manual-training bench.

It is through this pushing forward of the innate tendency — this *delayed* gratification — that the first steps are taken away from primary passive attention, and the first step made toward active attention and the conquest of immediate desire. But education must not content itself with conquests that reach no further than this. It must start with these, but it must soon get beyond them. Other ideas, unconnected with

instincts, must be endowed with feeling and thus given strength to overcome immediate tendencies. The boy must come in time to work steadfastly at a given problem or a given task, even if a primitive desire is not to be gratified either immediately or in the future. In other words, the most effective ideal that man has ever conceived is the one that is farthest removed from the primitive sanctions. It is the ideal of *duty*, and the individual who does not form an effective ideal of duty in his early life will find it hard to adjust himself satisfactorily to a world that gives its richest rewards only to those who are able to hold themselves in leash through the storm and stress of struggle and temptation. It is only when a man works from motives of duty that one can depend upon him without question. But when a man has lived through his early life accustomed to shirk tasks that are distasteful or for which he can see no gain to himself, he is pretty certain not to be dependable. He may do what he should do if he wishes to or if the reward is clear and tangible; but in the important crises, he is almost certain to fail. It is one of the serious defects of modern educational theory that it has tended through its emphasis on interest and the immediate impulses of children to obscure this principle. We shall return to this topic in Chapter XVI.

Summary. Man's equipment of ready-made or inborn responses is, at birth, meager compared with that of many lower animals. With the exception of purely reflex mechanisms, the more or less definite responses which man makes to definite stimuli are the result of innate *tendencies* to respond rather than the result of ready-made pathways or connections. These tend-

encies give rise to certain adaptive, individualistic, sex, and social impulses. Prominent among the activities which these urges or drives call forth are curiosity, play, collecting, construction, fighting, self-assertion, sex and parental behavior, rivalry, and gregariousness.

Instinctive tendencies are always accompanied by feeling. It may also be said that, apart from training, to satisfy or express them is generally pleasant, while to inhibit them is unpleasant. Although the expressions of some instinctive tendencies do not need to be changed, by far the greater number of them need redirection if individuals are to live together in civilized society. Many of these tendencies are of direct value in the education of children. Although all education rests in the last analysis upon our inborn tendencies, man to be man must get beyond them and above them. It is the business of the teacher to harness these urges in the interests of the child's education; neither to ignore them nor to work against them, but rather to redirect the responses when necessary and desirable.

Instinctive behavior may be modified in three ways; (*a*) by attaching another feeling with its appropriate response to an object that naturally arouses an undesirable tendency; (*b*) by attaching another response to an object and to the feeling that the object naturally arouses; and (*c*) by detaching a feeling from both the object and the response that naturally go with it and linking it to a different object and to different responses. These processes are sometimes called *conditioning* instinctive impulses, and the resulting behavior is sometimes called a *conditioned response.*

Definitions and Explanations of Terms Used

Reflex activity. This consists in its most simple form of an excitation that is mechanically carried over, or "reflected," from a sensory to a motor neurone. Consciousness may or may not be present. In either case it performs no service in directing the behavior.

Instinctive tendency, urge, or drive. This is an inborn impulse toward a more or less complex form of behavior.

Innate. Something born with the individual; distinguished from that which is *acquired.* An innate tendency may be present at birth, or it may put in its appearance later. However, if it is innate, it is not gained through experience, although it may be, and in man usually is, modified by experience.

Modification of instinctive tendencies. Changing the character of an innate tendency. The resulting behavior is sometimes called a *conditioned response.*

Doctrine of natural punishments. The theory that the unguided experience of the child will lead to the essential modification of innate tendencies.

Ideal. An idea surcharged with feeling, and thus made an effective end or goal or standard of conduct.

QUESTIONS AND EXERCISES

1. Distinguish between reflex behavior and behavior resulting from instinctive tendencies. Illustrate.

2. What words are used interchangeably with instinctive? With tendency?

3. Distinguish between the instincts of animals and the instinctive tendencies of man. Illustrate.

4. Give the classification of instinctive tendencies. What tendencies are included in each group?

5. Note the behavior of a young child for a period of an hour. List the activities which you observe that seem to be due to instinctive tendencies and indicate what tendency each activity seems to be expressing.

6. Observe a lesson in the lower grades. Indicate the various provisions which the teacher makes for the expression of instinctive urges. Note any attempts to modify less desirable tendencies. Which of the three methods, *a*, *b*, or *c*, did the teacher use most often?

7. Think of one of your dominant urges or drives. What feelings arise when it is inhibited? When it is given free rein?

8. Illustrate useful and harmful expressions of rivalry. Why is rivalry among groups more desirable than rivalry among individuals?

9. Explain, "Man, to be man, must get beyond instinctive tendencies."

10. State and illustrate three ways of modifying instinctive tendencies.

11. Find in your own experience instances of the modification of instinctive tendencies by unpleasant consequences. From your own experience which type of incentive seems more powerful, hope of reward or fear of punishment? What difference, if any, would it make whether you consider childhood experiences or adult experiences?

12. Define an ideal. In what ways are ideals like instinctive tendencies?

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CHAPTER VIII

HABITUAL BEHAVIOR AND THE LAW OF HABIT BUILDING

Habit contrasted with instinctive behavior. Habit, like reflex and instinctive behavior, depends upon paths of preferred conduction in a chain of sensory and motor neurones. The important difference between habit and reflex behavior is the difference in origin. This difference is best expressed by saying that the neurone connections underlying habits are *acquired through the experience of the individual,* while the neurone connections underlying reflex and instinctive behavior are inherited. Reflex movements and instinctive tendencies are fairly constant with all members of the same species, varying only in intensity; habits, on the other hand, vary in kind with different individuals. The animal that depends chiefly upon inherited neurone connections is suited only to a narrow range of life; it must live in the environment for which its inherited equipment fits it. The animal that has the power to modify instincts and to form habits can *adapt* itself to varying or changing environments. It is by no means an accident that man is the most widely distributed of all the animal forms inhabiting the earth, for man has by far the greatest capacity for adaptation. He is found in all of the climatic zones and at all altitudes above sea level except the very highest. Natively fitted only for life on land, he readily learns to swim

and to dive (to " adapt " himself to the medium which is " natural " to fishes and amphibians) and even to fly (to adapt himself to the habitat to which only birds and insects are naturally adapted).

The feeling element in habits. Since habits have so many resemblances to inherited behavior patterns it is not surprising to find that the expression of a habit, like the expression of an instinctive tendency, is frequently accompanied by a pleasurable affective tone. A complex habit, indeed, becomes pleasurable as it becomes automatic. The difficult feats of skill which are acquired through a period of intense and often disagreeable effort come to be sources of enjoyment; just "going through the movement" is often a pure delight.

The fascination which games of skill possess for the initiated illustrates this principle. The beginner finds the complicated movements involved in playing golf, tennis, or billiards difficult to master; he becomes discouraged and is often tempted to give up the task and seek his recreation in something else. But gradually, as the art is acquired, the unpleasant factors are eliminated; and when the activities have become fairly automatic and mechanical, a real pleasure attaches to them. Almost everyone who has learned to drive an automobile will testify to the validity of this observation. The same transition from a stage of unpleasantness to pleasantness and even fascination is to be observed in the growth of almost every habit. The cold morning bath is ordinarily not only unpleasant but highly disagreeable to the beginner; but continued practice makes it a thoroughly gratifying exercise. The novice at the piano looks upon the dreary hours of practice as the last word in drudgery; but once the technique is mastered — once the adjustments have become automatic — playing becomes a delightful pastime.

This affective " propensity " of habits is most clearly recognized, however, when the customary expression or activity is interfered with. Our routine is broken

up; the stimulus that ordinarily " sets off " a series of movements is prevented from doing so; and we feel irritated, ill at ease, out of harmony with our surroundings. Indeed, if the break is sudden and unexpected — if an unlooked-for situation comes between the stimulus and the habitual response — a period of emotional excitement may ensue, precisely as it does when a strong instinctive tendency is suddenly blocked.

The importance of habit formation. In one sense, the whole process of education culminates in the formation of useful habits — in the acquisition by the individual of certain forms of behavior which will adapt or adjust him to the life which he is to lead. As will be pointed out later, however, education in the school and home cannot form all the useful habits that the individual will need, for the conditions of life are continually changing, and neither the teacher nor the parent can predict with certainty just what habits will be needed in the mature life of the individual. Hence, while all education may culminate in habit, it does not follow that school education does nothing but form habits. A very important part of its duty is to prepare the individual to form habits for himself when he needs them — to furnish him with *conscious* guides to behavior which will permit him to meet new situations — as well as to fix permanent and relatively rigid habits which will control his conduct in the unchanging situations. The former problem will be the theme of a later section; it is with the latter problem that the present chapter is concerned.

A rule for habit formation. The process of habit-forming in education may be stated under three heads:

(1) *focalization* of consciousness upon what is to be learned; (2) *attentive repetition* of the activity; (3) *permitting no exceptions* to occur until the habit has been established.

(1) *Focalization.* This really means gaining a clear idea of the way to go to work in order to form the habit. Very frequently the teacher gives a *demonstration* of the appropriate movements, making certain that the pupils know what they are trying to do and that they see the relationship between what is done and the results of the activity.

Habits may also be initiated by the process of trial and error described in Chapter II. The individual blunders about in trying to solve a situation, and finally hits upon the fortunate combination of movements that will meet his purpose. This successful method stands out from the others simply because it is successful. He repeats it readily, and the habit may be quickly established. In general, however, this method is of only slight importance in education. As will be shown later, it is essential to economy of habit formation to begin with the most effective and economical adjustment and not to run the risk of permitting inadequate habits to be formed. It has been said that fully two-thirds of the drill work of the teacher in the elementary school is given over to the breaking of inadequate habits that the child has been permitted to form. One way to reduce this waste in education is to see to it that the right habits are formed first.[1]

[1] Recent experiments suggest the *possibility* that practicing erroneous movements for a time and then shifting to the correct movement may aid in getting the latter well established.

(2) *Attentive repetition.* It is probable that no habit can be formed without repetition, and it is certain that much repetition is essential before most of the habits that are educationally important can be firmly established. The combination of movements constituting the habit must be repeated over and over again until the neurones are permanently connected. This is what is implied by the " law of exercise " or the " law of use " as discussed by some psychologists.

Furthermore, *mere* repetition, if not ineffective, is at least uneconomical. *Attention must be given to the repetitions.* Among the lower animals it is often impossible to secure such attention, and for this reason the only habits that can be formed are very simple in their nature and a longer time must be spent in their acquisition. Drill is necessary in learning, but it should never be lifeless, mechanical drill. The learner must be made conscious of successful efforts by having commendation attached to them, and it is equally if not more important that failures and inadequacies be recognized and condemned. This is the so-called " law of effect " at work.

The necessity for securing attention to the repetitions involved in habit formation is recognized by skillful teachers in the invention of *devices* which will insure the pupils' interest in the work, and relieve the monotony which is otherwise inevitable. A device is a means of varying the work in some of its nonessential or superficial details, while, at the same time, the fundamental adjustments or movements are preserved. Thus, in making automatic the associations represented by the tables in arithmetic, different types of exercises are introduced; the difference, however, is in the details; the fundamental relations of the numbers are still preserved.

Spelling, as a habit-building process, consists in making auto-

matic the sequence of letters in words. In English spelling, these sequences must in many cases be mastered literally by "main strength," for there are very few rules that will aid one. The spelling of each word, then, becomes as it were a separate habit, and the problem in teaching spelling is first to focalize the form effectively, and then to insure attentive repetition until the proper order of the letters has become "second nature." Devices for sustaining attention are particularly important here. One of these is the spelling match. Here rivalry is brought into the service of habit formation, impelling the individual to repeat attentively that he may later make a good record either for his own advancement over others or for the honor of his side.

In general, marks and grades may be looked upon as devices for impelling the pupil to give the necessary effort to his work when the intrinsic and immediate interest in it has died away.

(3) *Permitting no exceptions.* In establishing a new habit, especially when it opposes, as it often does, an old habit that must be uprooted, or when it opposes a strong tendency whether innate or acquired, it is essential that no exception to the desired behavior be permitted, and especially that there be no relapse to the undesirable response. While this principle is important in all phases of habit formation, it has been emphasized most frequently in connection with the so-called " moral " habits.

One of the most important applications of this principle in education is to undertake only a few habit-building processes of the same sort at the same time. In spelling, for example, it is well to take up only six or eight new words at a time, to focalize these adequately, and to keep recurring to them until they are thoroughly mastered. In correcting inadequate or ungrammatical habits of speech it is also essential to proceed systematically, one error at a time, keeping

the correct form constantly before the pupils, and seeing to it that it is used in place of the incorrect form.

The importance of attitude in habit formation. The law of habit formation, which is involved in the three principles discussed above, should be applied with a full knowledge of certain general characteristics of the habit-building process and of the conditions under which habits are economically established. The first of these more general conditions is illustrated in all three of the principles just discussed. *The attitude which one takes toward the habit to be formed is a fundamental factor in the efficiency of the habit-forming process.* If one is imbued with a strong desire to master the new habit, it is clear that one will focalize it more carefully, repeat it more attentively, and avoid exceptions more zealously than if there is no particular interest in its formation — hence the importance of insuring in the pupil a strong motive for thoroughly mastering the new adjustment.

This *motivation* of the learning process may be accomplished in several ways, each of which, however, is more easily described than applied. It is sometimes possible to show the pupil the *need* for the new behavior, and thus provide him with what may be called an *intrinsic motive* for making it automatic — that is, a motive that is directly related to the value of the behavior in life. If the pupil realizes, for example, that perfecting his speech forms will enable him to communicate more effectively, he may have an *intrinsic motive* for the study and repetition essential to this end. If he is convinced that an absolutely automatic mastery of the addition and multiplication

tables will save time and money in his business relationships, he may have an intrinsic motive for undergoing patiently and persistently the necessary drill.

Motives may be closely related to the child's life and interests. It is obvious, however, that these intrinsic motives which relate directly to the life activity for which the special training in question prepares, cannot always be used in the lower schools, for the reason that the pupil cannot always appreciate and understand the ultimate value of the material that he is asked to learn. It becomes necessary, then, to introduce other types of motive, similar to the devices referred to above. The practice approved at the present time by most educators is to emphasize, as far as possible, motives that *relate clearly and closely to the child's own immediate interests and childish needs.* Thus the teacher who wishes to emphasize the importance of serious work in language may interest his pupils in a correspondence club formed in coöperation with another school. Or a school exhibition or entertainment may be planned, and the pupils asked to write the invitations to their parents and other members of the community. They may work out, write, and learn the speaking parts of a drama. The importance of the arithmetic drills may be impressed by showing how essential is accurate and clear-cut number work to good results in the construction activities of the school workshop. Motivation through relating learning activities to the immediate life problems of the learner lies at the basis of the *project method* of teaching.

In any case, it is essential to stimulate the will to learn, and the teacher who can successfully attain

this end is almost certain to accomplish good results in the habit or skill studies. The importance of attitude in learning is brought out by some psychologists in the " law of readiness."

The importance of the right start. The economy of initiating the desired habit in its simplest and most economical form has already been referred to. Many teachers in the departmental work of the high school or the college prefer that, in the special subjects which they teach, the students who come to them should have had no previous training. This attitude is an implicit recognition of the dangers that the wrong start involves. A great deal of the criticism that the schools meet from business men who employ public-school graduates is due to the fact that — along with the valuable habits that the school has implanted — certain very undesirable modes of behavior have been permitted to become habitual. Sometimes these are represented by clumsy and uneconomical methods of writing and computation; more frequently it is the moral habits that are defective. The boy has not been " disciplined " into habits of obedience, promptness, industry, and respect for those in authority; and his bad habits must be uprooted before he can do his work properly.

The phenomenon of interference in habit formation. When different habits that are in the process of formation clash in certain of their elements, it is necessary that these be continued until they are firmly established; otherwise they may mutually destroy one another. This fact of *interference* has long been recognized, and recently an attempt has been made by actual experiment to learn more precisely just how

this interference operates. It has been found that, at the outset of the process of forming two conflicting habits, the learning of either is not so rapid as if it were being mastered alone. After the lapse of some time, however, both are as firmly established as if they had not been in conflict at the outset, and in the aggregate no time is lost because of the original interference.

The learning of two foreign languages during the same period of time is a case in point. At the outset there is a danger of confusing the vocabularies and idioms, but if the practice in both is continued, an effective mastery will be attained. The person who has learned both French and German until he can speak either fluently does not confuse the two tongues. For each he has a definite set of habitual associations, probably represented in the nervous system by separate sets of connected neurones. The practical significance of these principles may be formulated as follows: Never begin the mastery of two conflicting types of behavior unless both can be continued long enough to become permanently established habits.

The importance of intense effort. In forming a new habit, the learner should, at times, put forth the greatest effort of which he is capable. It often happens that, in these periods of unusual effort, a higher degree of efficiency is reached than could possibly be attained otherwise; and when this level is once achieved, it gives the learner confidence to persevere until he can maintain it permanently.

The distinction between the expert and the mediocre workman is often found in the ability of the former to reach this level of maximal efficiency and to maintain himself upon this level. The difference between the poorly paid stenographer and the successful court reporter is a difference between these two levels of mastery. It is often a *little* greater accuracy and a *little* greater rapidity that makes one person an expert and another a drudge.

The practice of the schools to devote certain brief periods each day to intensely concentrated, "rapid-fire" drills in arithmetic, spelling, language, and other subjects is to be commended from the point of view provided by this principle. *It is the intense effort that educates.*

Rapidity *vs.* accuracy in habit formation. It is a fact of common observation that "Haste makes waste." There is a point in every stage of learning beyond which the rapidity with which the work is done will be the source of many errors. While it is desirable to speed up the learning occasionally, it would be unfortunate to continue this excessive speed at the expense of accuracy in performance. Continued errors and unskillful methods of work soon become permanently fixed, and then a high grade of attainment will be very difficult to achieve. The learner should be encouraged to keep to as high a level of rapidity as is consistent with accurate results, but should not be urged to work so rapidly that the results will be inferior.

Slow learning does not necessarily mean that the work is being done in a careful manner. Many pupils learn slowly largely because they are indolent and inattentive. These should be stimulated to do more rapid work. Their slowness in no way promotes efficiency. In the ideal school, where each teacher will have only as many pupils as he can teach effectively, it will be possible to study each pupil as an individual to determine the conditions under which he can work best. *As a rule fast workers are accurate workers.*

Rapid readers usually comprehend what they read better than slow readers. Good things tend to go hand in hand.

The specific character of habits. Habits are specific. They consist in doing certain definite activities in certain definite ways. The term "general habit" has been a source of confusion in educational theory; and while there is some justification for employing the

word in connection with *habitual attitudes* of mind and body, it will promote clear thinking to confine the word "habit" to the *specific* responses to *specific* situations or stimuli.

The specific character of habits might be inferred from the physical basis which has been assumed for these modes of behavior — that is, the formation of preferred paths of conduction among definite groups of neurones. This implies that the excitation must move in one direction, and only one. When there is a possibility of the excitation taking various courses, then the habit has not been completely established; and hesitation and conscious direction must intervene. A fully established habit is one in which the connection between stimulation and response is firmly fixed, and in which the resulting behavior is definite and certain.

The limitations of habit. While it is desirable that the individual should be equipped with as many useful habits as possible, no human life should be given entirely over to the sway of habit. The person who has all or most of his activities reduced to the plane of unvarying routine is simply a machine. To grow means to have fresh interests, to meet new problems, to put old responses together in new ways — in short, to build new habits. One of the ideals that the mature individual should cherish is the ideal of growth, and this should impel him assiduously to seek for means through which behavior may be improved. With advancing years, the temptation becomes stronger and stronger to rest content with the progress already made. What has been aptly termed "the plasticity of youth" is lost. New modes of behavior are acquired slowly and with increasingly distasteful effort. To keep young means to fight against this natural tendency to crystallize one's life in the inflexible forms

of routine behavior. Thorndike [1] has demonstrated that actual *ability to learn* declines only very slowly with advancing age; it is really the lack of a *will to learn* that keeps so many adults in a rut.

While drill is an indispensable method of education, the teacher who devotes all of his time to this process will fail really to educate his pupils. Beyond and above the specific habits that are to be built up (and which must never be neglected) are the meanings to be developed, the facts and principles to be impressed, the ideals, standards, tastes, attitudes, and points of view to be engendered. It is these that will prepare the child for the new and varying situations of life, while habit-building looks after the unchanging or constant situations. It is particularly through knowledge upon the one hand and ideals upon the other that the pupil is prepared to form for himself *new* habits that will fit new circumstances in his life. This problem will be discussed in later chapters. (See pp. 206 ff., 299 ff.)

The importance of teaching pupils how to form habits. The preceding discussion leads to a final topic in connection with habit building. Not only is it essential that pupils be led to form useful habits; it is of prime importance that they be given a mastery

[1] Edward Lee Thorndike (born 1874), whose early work was concerned with studying animal intelligence, has done more than any other person to promote the scientific study of educational problems. His work in the refinement of statistical methods as applied to these problems is especially notable. Dr. Thorndike has been professor of educational psychology in Teachers College, Columbia University, for over a quarter of a century and is the author of many books in the field of psychology. His *Educational Psychology* in three volumes is probably the best known of his works. Dr. Thorndike's recent investigations have been in the field of adult learning.

of the *method of habit formation.* Out of the specific disciplines of spelling and penmanship, learning the multiplication tables and memorizing selections from literature, coming to school regularly and promptly, obeying those in authority and respecting the rights and feelings of others — out of these the great lesson of *self-discipline* should gradually emerge. The child who leaves the elementary school should know how to go about it to form a habit for himself; he should understand the importance of adequate focalization, attentive repetition, and the avoidance of exceptions — although he need not know these names; and above all, he should appreciate the significance of attacking a habit-building task aggressively and persisting in it unremittingly. The best teachers are those who make these great lessons of life shine out clear and strong through the seemingly trivial details of the day's work.

Summary. Habits once they are formed operate very much as do reflex movements and the responses to instinctive tendencies. Both drive the organism on to act. If activity is forthcoming, pleasantness results; if the activity is held up, annoyance results. Habits are formed by focalizing upon that which is to be learned, by attentively repeating the processes involved, and by permitting no exceptions to the desired sequences. Even with these three guides for forming habits, little will be accomplished unless the learner wishes to acquire the habit. Attitude, motive, readiness, and mind-set are of paramount importance.

While habits are of great significance they do not prepare us to meet new situations; they do not provide for changing conditions of life. In order that the indi-

vidual may be able to meet new situations, he must acquire a stock of meanings, ideas, facts, principles, ideals, and standards.

Definitions and Explanations of Terms Used

Habit. A habit is a path of preferred conduction between stimulus and response, set up by and due to the life experiences of the organism.

Skill. A combination of specific habit responses in a larger habit unit.

Focalization. The process of gaining a clear idea of the way in which different elements go together to form a desired habit.

Attentive repetition. Repeating with careful attention the response or the series of responses which, when mastered, constitute the habit or skill.

Motivation. That phase of teaching which makes sure that the learner will attack the learning process with aggressive zeal.

QUESTIONS AND EXERCISES

1. How are habit and the innate behavior patterns alike? Wherein are they different? Why is a firmly fixed habit sometimes referred to as "second nature"?

2. Name some of the important *specific* habits that education must impart. (Remember that a specific habit is a specific or particular response to a specific or particular stimulus or situation.)

3. In what different ways may adequate focalization be encouraged?

4. What is meant by *attentive* repetition, and what is its significance to the process of habit formation? What steps may the teacher take to insure that the pupil is attentive to the necessary repetitions?

5. Why are exceptions unfortunate in habit formation?

6. What is meant by interference in habit formation? Illustrate. How may its evils be avoided?

7. Of what significance is the mental attitude of the learner in forming habits? Suppose two children are forming the habit of dressing quickly. One of them likes to dawdle over the process but her mother insists that she hastens. The other tries to dress quickly because she wishes to go with her father for the milk before breakfast every morning. How will the habit formation differ in the two instances?

8. What is the relation between accuracy and rapidity of movement in forming a habit?

9. What is meant by the statement that habits are specific?

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CHAPTER IX

PERCEPTION AND IMAGINATION IN RELATION TO BEHAVIOR

In the preceding chapters, consciousness has been referred to as an important factor in controlling behavior. Innate patterns of behavior and habitual behavior, as we have seen, may be largely independent of conscious direction; but we have also seen that, if behavior resulting from innate tendencies is to be changed or redirected, or if specific habits are to be applied to situations different from those in which they have been formed, consciousness must control the processes of redirection or transference. We may reverse this statement and say that whenever consciousness is present, there is some aspect of the total behavior that is not completely mechanical.

Definition of perception. All sensory experiences in the mature or adult consciousness are sensations *plus meaning*. This meaning given to a sensation makes it a perception. Perceptions, then, are sensations to which meanings have been attached. Further, the meaning is gained through action. All sensory experiences tend to find expression in movement. This is what is called the "sensori-motor" character of experience. It is because we behave in certain ways in reference to certain sensations that they have gained the meaning that they have for us — that they have become perceptions.

This book that I see before me has meaning as a book in terms of what I can *do* with it, not simply in terms of its appearance to the eye. It is a book because I can handle it, turn its pages and read its contents. Similarly, the bell that I hear has a meaning insofar as my behavior has some relation to it. If I recognize it as a dinner bell, the sensation *means* that I can respond in some way to the sound, either actually or in imagination. Conduct, either by myself or by some one else, either actually executed or merely pictured in the mind, gives the whole meaning that the sound has as dinner bell. If I perceive the sound as some other kind of a bell, then the meaning that I give is to be analyzed in terms of another kind of behavior. The fire bell means certain types of behavior, the car bell other types, and the telephone bell still other types. Further, the fire bell means certain kinds of behavior for the fireman, other kinds to the crowd in the street; the car bell calls forth certain kinds of action from the motorman, other kinds from the passenger, still other kinds from the driver of a near-by wagon; the telephone bell signifies a certain sort of conduct for the owner of the 'phone and other sorts for the person in the next apartment who happens to hear it.

Since perception is dependent upon sensation, we shall turn our attention to a brief consideration of the various kinds of sensations to which the excitation of the sense organs gives rise.

Definition of sensation. The external world manifests itself to us through physical stimuli that set up excitations in the sense organs. These organs are primarily differentiated or specialized ends of sensory neurones. (See p. 85.) Each sense organ picks up a special type of physical stimulation and ordinarily responds to no other type of stimulation. The stimulus thus picked up by the sense organ is transformed into an excitation of the nerve substance, and this excitation travels up the sensory nerve fibers.

It may be deflected to a motor neurone at some point below the cortex of the cerebrum; if this is the case, the sensory impression may never become a matter of consciousness, and the behavior is thoroughly mechanical — either reflex or habitual, accordingly as the pathway between the sensory and the motor neurone is inborn or acquired (pp. 87 ff.). If, however, the sensory impression reaches the cortex of the large brain, it will probably give rise to a definite sensory experience (see p. 92). *This consciousness which is correlated with the stimulation of a sense organ is termed a sensation.* Pure sensations, however, do not exist in any developed form of consciousness. What we ordinarily call sensation is something more as we have already seen. Past experience has given the mere sensation a *meaning* and then it is a *perception.* It is instructive, however, to view sensations for a brief space as if they were detached from the elements of meaning with which in actual consciousness we always find them fused.

Classification of sensations.[1] Sensations are grouped into the following classes: visual sensations; auditory sensations; sensations of taste; sensations of smell; sensations of pressure, temperature, and pain; kinæsthetic sensations; and organic sensations.

[1] Of all the varied manifestations of mind, sensations have been the most thoroughly investigated. This is probably due to the fact that the *experimental method* can be more readily applied to the investigation of sensations than to other phases of mental life. The first laboratory of experimental psychology was established at the University of Leipzig in 1879 by Wilhelm Wundt (1832–1918), who will doubtless rank as one of the most important figures in the history of science. Many well-known psychologists received their training at Leipzig under Wundt — among them, E. B. Titchener, J. McKeen Cattell, and Charles H. Judd.

(*a*) *Visual sensations.* One of the most important varieties of sensory experiences is that of vision. The visual sensation is due to light waves in the external world acting upon the sensitive part of the eye, that is, the *retina*, which contains the ends of the specialized visual neurones.

Differences in the *length* or vibration-rate of light waves give sensations of various colors. For example, the longest wave of light to which the retina responds gives a sensation of red, the shortest gives a sensation of violet. Differences in the *intensity* or vibration-extent of the light wave determine the intensity or saturation of the sensation.

(*b*) *Auditory sensations.* Hardly less important than vision is hearing. Auditory sensations are caused by sound waves, which are vibrations of air particles, acting through a complicated mechanism upon the sensitive parts of the ear — the delicate basilar membrane of the internal ear which is connected with the specialized auditory neurones. Regular vibrations produce tone, irregular vibrations produce noise. The lower the rate of vibration, the lower the pitch; the higher the rate of vibration, the higher the pitch. Differences in the intensity or vibration-extent of the sound wave determine the intensity or loudness of the tone or noise.

(*c*) *Taste or gustatory sensations.* The sense organs of taste are to be found on the tongue and the soft palate. Substances in liquid form, or that can be dissolved in the mouth, excite these sense organs. There are but four tastes — sweet, bitter, sour, and salt. All other so-called tastes are really combinations of one or more of these four true tastes with odors (sensations

of smell) and are more properly referred to as "flavors" than as "tastes." If the sense of smell is cut off by stopping the nostrils with cotton, strong coffee and weak quinine will alike taste bitter; vinegar and lemon juice are merely sour; and so on. We know that it is a common practice, in order to "kill the taste," to hold the nose when taking some disagreeable medicine. As a matter of fact, feelings accompanying the smell sensations are the disagreeable part of the experience.

(*d*) *Olfactory sensations.* The sense organs of smell are to be found in the upper portion of the nose. These are stimulated by substances in the form of gas. There are six classes of odors according to Henning. They are as follows — fruity, flowery, spicy, resinous, smoky, and putrid. Most odors, however, are combinations of these six groups. When you think of all the possible compounds of the six elemental odors and the various intensities of each that are possible, you can gain some notion of the very large number of odors which it is possible to distinguish.

(*e*) *Dermal sensations.* In the skin are to be found various sense organs that are affected by stimulations of four different kinds and are connected with the sensations of *pressure*, *warmth*, *cold*, and *pain*.

There are no other sensations that come from the skin except these four. Such experiences as wetness, dryness, sharpness, smoothness, and roughness are merely compounds or fusions of these three fundamental sensations, often with added sensations of movement.

It is an interesting fact that the points of origin of the various dermal sensations are not equally distributed over the skin, but are located in small spots. If a blunt-pointed piece of cold metal, or a

lead pencil not too finely sharpened, be moved over the back of the hand, for example, there will be found small areas, scarcely more than points, at which a distinctly cold sensation will flash forth, but there will be larger spaces between these points which do not respond to the cold stimulation. If the metal point is warmed and moved over the same portion of the skin, similar but not identical points responding to the warm stimulation will be found. If the skin is tapped with a horsehair, pressure spots can be located. Pain spots are also found by using a stiff hair, pointed at the end and pressed down on various parts of the skin. There are some parts of the body that are extremely sensitive to pain, while others are incapable of sensing the prick of a needle.

(*f*) *Kinæsthetic sensations.* There are sensory neurones that have their dendrite-endings in the muscles, the tendons, and the joints. Sensations arise at these points — the *muscular* sensations from muscles, *strain* sensations from tendons, and *articular* sensations from joints. These sensations, although not commonly attended to, are extremely important in the behavior of the individual. They make one aware of the movements that are made and consequently play an indispensable part in the conscious control of movement. Without them accurate voluntary movement would be impossible. The ability to improve our behavior — to make it more accurate and efficient — is due largely to these *motor* or *kinæsthetic* sensations. They inform us immediately of the way in which we are acting in the situation before us. The fusion of kinæsthetic sensations with sensations of other types is one of the most important factors in building up meanings — in giving to us a world of meaningful objects (p. 208).

(*g*) *Organic sensations.* There is still to be considered the important group of *organic* sensations. They

arise in connection with the activities of the internal organs. Hunger, thirst, nausea, and sensations arising from breathing and the circulation of the blood are examples of organic sensations. These play an important part in our emotional experiences, as we have already seen (pp. 67 ff.). They have also a great deal to do with our so-called "self-feelings." Because they are so thoroughly fused with other parts of consciousness, however, they are difficult to analyze, and comparatively little is known about them.

The significance of sensory defects. Since all of our experiences come originally through the avenue of one or more of the senses described above, it follows that the education of the individual will be hindered unless these senses are actively working. The person who has lost his eyesight or who is deaf will be badly handicapped in his learning. A few individuals who have lost the two important senses of sight and hearing have with great labor been educated through the channels of the dermal and the kinæsthetic sensations. Such persons obviously need very special treatment, and their education must be for the most part individual.

As far as the public school is concerned, a more serious problem arises in connection with those pupils who are not actually blind or deaf, but whose vision is faulty or whose hearing is poor. This dullness of sensation often prevents such children from understanding the ordinary school instruction, and not infrequently they are looked upon as backward or even feeble-minded. There are a few simple tests that can be used to discover these lacks, and they should be applied to find out as far as possible whether any of the pupils in

the school are suffering under serious handicaps in their learning. Investigations have shown that eye defects are extremely common among school children and that partial deafness is also an important factor in retarding the pupils.

Meanings come from behavior. We have already emphasized the fact that *meanings are made and changed in terms of behavior, and of behavior alone.* We perceive objects only insofar as they are directly or indirectly recognized as influencing action. An object that could not call forth any kind of response in reference to it would be no object at all. This point of view is of the greatest importance in the field of education. Following this principle, one may say that *all learning at basis consists in doing.* Not only should education lead to better action; the very possibility of education arises out of action. The process of learning is not a passive process in which a certain amount of information is poured into the mind. Before the mind can assimilate what we call knowledge, it must have a stock of meanings, and these, in the last analysis, have come from actual motor responses to real situations. This is one reason why the kinæsthetic sensations are so important in making objects meaningful. (See p. 145.)

In recent years this principle of activity on the part of the child in connection with his learning has been generally recognized. In the kindergarten and in the primary grades the child is required to perform various acts in reference to the objects that form the materials of his instruction. He gets a certain meaning for the word "ball" when he pronounces it, or writes it, or draws the object that it represents; another meaning when he handles the ball itself, throws it, and rolls it about. A yard means something to the child who actually measures it off on the floor of the schoolroom; the

pupil perceives that two pints make a quart when he fills up the quart pitcher from a pint measure; number work acquires a new meaning when the arithmetical processes are employed in actual situations, as, for example, in the school bank. In connection with every subject of the school curriculum some form of actual conduct is necessary for substantial learning and if this activity is connected with problems that appeal to the learner as worth solving so much the better. (See p. 214.)

Meanings are individual. Since various objects and situations mean different things to different persons, insofar as they have behaved differently toward these objects and situations, it is evident that this difference in meaning must always be taken into consideration. This is a fact that has long been known, but not sufficiently regarded. We are likely to think that a situation which means one thing for us means the same for everybody else — a source of trouble when we are dealing with others. It is particularly fatal for the teacher to assume that the child attaches the same meaning to objects and events that the adult attaches to them. The child's experience has been extremely limited, and the meanings that the most common things possess are often fragmentary, inadequate, and especially limited in range. It becomes the business of the teacher, therefore, and of all others who are dealing with children or adults in a practical way, to discover the meanings that the ordinary situations in life possess for those who are to be taught. *It is wrong to assume that the same thing, the same act, or the same event, has the same meaning for all. It is a much more disastrous error to assume that words have the same meaning to all — for words to have any meaning whatsoever must be associated with objects, acts, and events.*

A number of investigations have been conducted in regard to the meanings that common objects possess for the child at the beginning of his school life; and the results have clearly shown that very little can be assumed as to what the child actually knows, even about the most simple things. It is particularly true that the city child has a very inadequate perception of the scenes and events that belong to country life, and it is useless to talk to him about these unless they have acquired for him some definite meaning. It is also true that the country child has a very imperfect comprehension of many of the things that are familiar to the city child. It would be a great advantage if the city child could spend some time in the country and if the country child could visit the city. However, since this is often impossible, the teacher must rely on a large amount of illustrative material in dealing with those things with which the child has had little or no acquaintance. Charts, models, lantern slides, and stereoscopic views are important aids in instruction if properly used. The moving picture is coming to be employed more and more as a means of making things remote from the child's experience really vital factors in his learning.

Apperception. The term *apperception* is one often used in psychology, especially in its applications to education. Apperception and perception are not essentially different. In either case the present experience is given its meaning in terms of the past behavior in regard to similar experiences. As we advance in life we build up a number of different attitudes toward the typical situations that confront us, and these attitudes may be considered as habitual tendencies to behave in certain definite ways in the presence of these situations. These habitual attitudes constitute the " apperceptive bases " for interpreting new experiences. It is a fact of everyday experience that the business man, the professional man, the artist, the teacher, the farmer, have different points of view that must be con-

sidered by one who deals with these different groups. What will strongly influence one group will have no effect on another. The politician in particular recognizes this, and in his appeals to the electorate he fashions his course accordingly. The most successful candidate for office is generally he who appeals to a few fundamental apperceptive bases that are shared by a majority of the people. He has the ability to "feel the public pulse." The person who is "remote from the masses" is he who either cannot comprehend their point of view, or if he does comprehend it, has no sympathy for it. From the point of view of education for citizenship an important task of the school is to insure a large stock of meanings that will be common to all citizens.

No more important educational principle has ever been formulated than that which reads, "Build instruction upon the experience of the learner." His knowledge of facts, his prejudices, his point of view must be understood, if his range of information is to be widened and his conduct influenced. It is particularly important that the teacher does not "go over the heads" of his pupils and that he take particular pains to relate new words to the learner's actual experience. It is equally important for the teacher not to arouse antagonism by disregarding the ideals, standards, and prejudices — the *mores* — of the community. The teacher in a new locality should be extremely careful not to praise unduly the locality from which he comes. He must have a regard for local pride, if he expects to get a sympathetic hearing. Nothing is more disastrous than to get out of touch with one's pupils at the start, or to arouse the antagonism of the community.

True and false perceptions. Since perception interprets sensations, gives them a meaning, it follows that this meaning may be correct or incorrect and that

the perception may be true or false. In regard to pure sensation, the question of its truth or falsity could never arise. It is an immediate fact and as such cannot be doubted. If I could have a " pure " sensation of redness, it would be neither true nor false; it would simply *be;* it would merely exist, and this existence would be a fact of consciousness that could not be questioned. When, however, I perceive the redness as the cover of a book, I may be right or wrong; the object may be what I perceive it to be, or it may not be. Even the redness as such may be wrongly interpreted. I have a sensation of redness, but as soon as I assume that this redness belongs to some external object, then there is the possibility of an error. As sensation it exists, but as a red object perceived, it may or may not be there in the world outside of me. It may, for example, be merely an after-image and wholly " in my eye " or an hallucination and wholly " in my mind." When I call it red, I thereby imply that it is an object that will be experienced as red by others and by myself at different times; in other words, that it is something that has a reality beyond my immediate sensation.

Behavior the criterion of true and false. When we ask how the true and the false perception may be distinguished, our fundamental principle of behavior becomes of immediate service. *We can find out only by our conduct and the conduct of others whether or not our perception is correct. If the perception that I have will " work " in my subsequent behavior, then I may be reasonably sure that it is true; if it will not " work," then I am obliged to consider it false. If it squares with known facts, it is true; if it does not, it is false.*

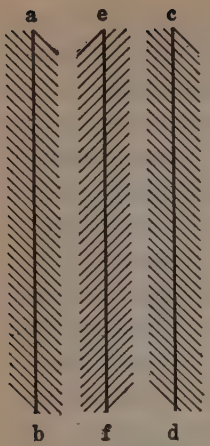

Fig. 6. The Zöllner illusion. (From Calkins, *A First Book in Psychology*, Fig. 25.)

A few illustrations will serve to make this point clear. In the accompanying illustration known as the Zöllner figure (Fig. 6), the heavy black lines do not appear to be parallel. That is my immediate perception of this figure. However, if I examine it further, I will find, on measuring the distance between the black lines, that it is the same at all points, and that my original perception does not agree with my subsequent experience in regard to these lines. Another example of this same fact is found in the false perception in regard to the area of the two accompanying figures from Wundt (Fig. 7). The area of the upper figure appears to be much smaller than the area of the lower. However, if the position of these two figures be reversed, it will be found that their size seems also to be reversed, the figure occupying the lower position always appearing to be the larger. Now, if I place one figure upon the other, they will appear to be exactly the same. Numerous illustrations of false perceptions of this type could be given.

One of the most striking instances of a false perception to be found in literature is that of the "air-drawn" dagger in *Macbeth*. It appeared to the overwrought brain of Macbeth as a substantial reality, but it would not stand the test of actually being grasped. In other words, Macbeth could not behave toward it as he could toward a real dagger. He could not make the perception "work

Fig. 7. Illusion in comparative area of two figures, after Wundt. (From Titchener, *Experimental Psychology*, Vol. I, Pt. I, Fig. 48 *B*.)

out" in his conduct. This is the only way by which we may distinguish reality from unreality.

The true perception may then be defined as a sensory experience that will work consistently in behavior. The false perception fails at certain points to do this. Under a clear sky the hills on the horizon are perceived as near at hand. I decide to walk to them; but I find it a long journey. My perception of the distance was wrong, and my subsequent test of walking to them was not in agreement with my original idea as to their distance. A person is afflicted with a mental disease; he hears voices plotting his destruction, and believes that he is followed by ruthless enemies. His behavior is influenced by these beliefs; it is no longer in harmony with that of the community, and he becomes dangerous to himself and to his fellows. So we judge as to the truth or falsity of our own ideas and the ideas of others by an appeal to conduct. This is the final, the only ultimate, test.

Illusions and hallucinations. There are two kinds of false perceptions, *illusions* and *hallucinations*. The Zöllner and the Wundt figures, previously referred to, are illustrations of the former, and the air-drawn dagger of Macbeth of the latter. *Both the illusion and the hallucination agree in the one essential particular, namely, that they will not work out consistently in behavior; but they differ, in that an illusion is quite normal, while an hallucination is abnormal.* I can prove in my own conduct that the palm trees and the pool of water that I see over the burning sands of the desert are not really there as I perceive them to be, for when I journey to the spot, I find no shade to protect me, no water to cool my thirst, and no verdure to rest the dazzled eyes. My companions, too, have had the same experience as I. The illusion is entirely normal and is to be explained by the condition of the atmosphere — that is, by something quite objective.

With the hallucination, however, this is not true. Macbeth *alone* saw the dagger; he might even have stretched forth his hand and felt its hilt, but others would not have had the same experience. His behavior would not then agree with that of the normal individual. The person who hears voices plotting his own destruction has generally no test by which he can discover that they are unreal, but others do not hear them. If all persons heard these voices, and if on subsequent tests it was found that the actions of all could be based on the perception of these voices, then we should conclude that they were real. We can put the distinction in another form by saying that the illusion always has a basis in the objective (external) world while the hallucination is either purely subjective (internal), or so largely subjective that normal minds will not have the same experience under the same objective conditions.

Classification of illusions. There are two kinds of illusions. The first kind arises from the fact that certain conditions that ordinarily exist are in the particular instance not present, and yet no allowance is made for the change. Mention has already been made of the hills that on a clear day seem near at hand, when in reality they are far away. This illusion is due to the fact that ordinarily objects at a distance are seen in a haze and are indistinct in outline, while objects that have a clear outline are near at hand. However, it happens in the particular instance under consideration that the atmospheric conditions are different from what they are generally, but I make no allowance for the unusual clearness of the air, and I perceive the hills

as near, when in truth they are many miles away. We get the exact reverse of this illusion when we perceive objects in a fog as remote and as unusually large. Our subsequent behavior, however, shows them to be small and near at hand.

An illusion of the second type arises when we are strongly expecting something to happen, when our minds are set in a certain direction. I am looking for a friend, and I seem to see him many times before he actually comes; I am listening for the toll of the light-house bell, as I strain my eyes through the fog and turn my head to catch its faintest tone. So I seem to hear it now and again, though in reality it is miles away. Illusions of this second type depend less on actually existing objective conditions than do those of the first type, and they approach in kind those false perceptions that have been given the name of hallucinations. When the idea in the mind becomes unduly powerful, then the individual is likely to have distinctly abnormal states of consciousness and to become the victim of a genuine hallucination.

We may remember that eventful journey of Ichabod Crane from the house of the Van Tassels through the gloomy darkness of Sleepy Hollow. Dejected and filled with fear, the mind of the unhappy pedagogue was set in just the right direction to get the fearsome experiences that came to him in the appearance of the headless horseman. He perceived falsely, he acted foolishly. If he had not been expecting ghosts, he might not have seen them. If his mind had been perfectly normal and his courage that of the average man, he would probably have detected the sham, and hence not have fled ingloriously. This illustration of a false perception is one taken from the border line between an illusion of the second type and an hallucination.

Hallucinations as symptoms of mental disease. Since our discussions do not lead us into the field of abnormal psychology, the practical significance of hallucinations need not be considered here. Suffice it to say in passing that they are often important symptoms in determining the nature of mental diseases. In the case of illusions, however, particularly those of the second type, it is a somewhat different matter. Children, most often of the primary-school age, get false notions in regard to reality, because they are unduly expectant, because they think that certain things are likely to happen, and because they are prone to believe in manifest absurdities. Often these false expectations are due to unwise suggestions that they get from their companions. They believe that there are dangers hidden in the dark because they have been told so, or because the conduct of others has led them to believe so. Little children quickly take up these ideas and weave them into realities that may result in harmful consequences. Adults must be particularly careful to suggest in no way those ideas that will work out injuriously in the behavior of the children under their charge. The mind of the child is highly imaginative and extremely impressionable.

A word of caution should be said at this point in regard to imagination and the danger of confusing it with false perception. Imagination, as will be shown in the following section, is neither deceptive nor false in its own nature; and although a vivid imagination may make one abnormally subject to illusion or hallucination, it does not generally do so. As will be pointed out, imagination gives to us a world

of reality not inferior to that opened up to us by perception.

Imagination. When I look at the table at which I am writing, I have sensations of color, of pressure, of strain. These are fused, and I *perceive* the table. I shut my eyes and recall the table in imagination. The object of my consciousness is not a table at the moment present to my senses; it is rather the *mental image* or an *idea* of the table. I am not only conscious of the mental image of the table, *but I am further aware that the immediate object of my consciousness is not then and there present to my senses.* The mental image has with it a certain quality that distinguishes it from the concrete object of perception that is directly present to the senses.

It is an interesting exercise to analyze the difference between the perception and the mental image or idea. If you observe, for example, a red disk on a gray background, you will have before you an object of direct sensory experience; you will perceive the red disk and the background to which it is attached. If now you recall in imagination the red disk with its background, you will probably find that it is less vivid than the object itself. The imagined red is hardly red at all, or any other color. Further, the objective disk has a distinct outline, while the mental image is hazy and without clear and permanent outline. It is also much more difficult to hold the mental image in attention than the actual object. Under these conditions it is a simple matter to tell whether the experience is to be classed as a perception or as an object of my imagination.

In the light of the above considerations, *imagination may be defined as the consciousness of an object of sensory experience with the additional consciousness that this object is not immediately present to the senses.* In other words, in a true state of imagination we are always

aware that the object of which we are conscious is not present at the time and in the place that we imagine it to be. I recall the face of a friend, his voice, his manner of walking, and so on, but I do not have the impression of his actual sensory presence. I *know* that I am imagining. If I had the definite experience of his actual sensory presence, I should have either a true or a false perception, as the case might be, but not a mental image.

Reproductive and productive imagination. Imagination is termed *productive* when it *recombines* former perceptions in new ways; when it merely *revives* a former perception or a number of such perceptions, without essential change, it is termed *reproductive*.

I recall the appearance of the desk at which I have been sitting, the face of a friend, or the voice of a singer at the opera. These are acts of the reproductive imagination. There is nothing new added; there is merely the revival of a past experience. On the other hand, I imagine the landscape of the planet Mars, and I do not reproduce what I have already experienced in the whole; I put together in new ways bits of landscape that I have seen in actual life, or in pictures, and this recombination gives me something unlike anything I have ever seen.

All works of art, all the ideas of great inventors, all the programs of political parties and the projects of men of affairs rest in the last analysis on the ability to recombine in new ways elements drawn from past experience. These creations may be real or unreal; it all depends on whether they can be made actually to work in everyday experience. It can thus be seen

that *to stamp imagination as unreal would be to stamp most that is essential in human life as unreal.* Without reproductive imagination the past would be gone beyond recall, and without productive or creative imagination not a plan could be formed for the future; not an ideal could be made to stand forth as a goal of brave effort; indeed, there would be nothing but the present, and that would be without significance or importance, since it could be neither interpreted through the past nor related to the future.

It must be remembered that, while productive imagination is "creative" in the sense that it calls to the mind something never actually experienced in the form in which imagination presents it, the elements entering into this creation are themselves not mere imaginary entities. They have formed a part of past experience. The wildest imaginings, the most impossible fancies of the mentally deranged, as well as the products of the greatest creative thinkers, inventors, and artists, all have some basis in previous experience. Nothing comes into the mind in the first instance except through direct sensory experience. It may be worked over and recombined, but nothing absolutely new is added. No reputable psychology of to-day recognizes what were once referred to as "innate" (*i.e.*, inherited) *ideas.*

The educational value of imagination. One of the most important of the practical problems that arise in connection with imagination relates to the value and danger of productive imagination in the early years of childhood. The child is prone through imagination to create a world of his own, to people it with all sorts of unrealities, and to treat it as objective. This seems to be a defect at the first glance; yet productive imagination greatly enriches the mind of the child; it extends his experiences beyond the narrow barriers of his

home life; it enables him to relive the great events of history; it may enable him to know in an almost personal way the men and women who, through the ages, have contributed most to human progress. In play, too, he lives through all sorts of stimulating experiences. He is thus provided with a world that is rich and varied, a world in which he lives as truly as in the world that the adult knows as the only actuality. It is important that the child have the advantages that this imaginary world is capable of giving him. On the other hand, however, it is dangerous to stimulate his fancies to the point where he cannot distinguish between what his imagination creates and what confronts him as hard, cold fact.

In deciding how far the child may be allowed to go in his construction of an imaginary world, there is one safe principle on which we may base our decision. This is the fundamental principle of *behavior*. We must ask ourselves what are the *results* in the life of the child, as he lives it day by day. Do his imaginary companions help him by appealing to them to solve his problems or do they keep him from the normal companionship of actual playmates? He is led to believe in Santa Claus. Does this belief give him an idea of generosity and kindness? Even if so, will disillusionment make him a confirmed skeptic? Does the stork myth offer to him a temporarily satisfying and harmless explanation of the origin of life, or should the child be told the simple biological facts? Most of these questions must be solved largely in each individual case as it arises.

In considering the extent to which the child's imagi-

nation may be allowed to have free scope and even be stimulated, the following important facts should be kept in mind:

(1) *The child seldom confuses the real with the fancied.* The normal child is usually capable of distinguishing between fact and fancy. In his play he imagines with great vividness that the stick that he bestrides is a prancing steed, yet he does not go so far as to confuse it with his father's horse. Toward the perceived horse he acts quite differently from the way he does toward the imagined horse. His conduct shows that he makes the essential distinction that is necessary to guide his behavior. The girl who is playing "house" does not attempt to eat the mud pies that she imagines to be like her mother's pastry. If the imagined object and the perceived object were treated as identical, then the behavior of the child would be such that he could not get on in the practical world to which he must conform.

(2) *The imaginary world a privilege of childhood.* The vividness of the child's imagination tends to lessen as he advances in years, and hence he naturally outgrows those fancies which in adult life would be absurd and injurious, but which in childhood are quite rational and helpful. His belief in supernatural beings, for example, is something that is on the whole helpful to him at an early age. He is too young to understand the materialistic conceptions that form the basis of the adult's view of life. It does not harm the child to believe in fairies, gnomes, and elves. It would be a serious matter if the adult held to such conceptions. When this crude supernaturalism that the child natu-

rally manifests in his earlier years tends to be outgrown, as it does at about the eighth or ninth year, it should no longer be insisted on. When the child is capable of understanding a new order of things, he should be instructed in that new order according to his ability to comprehend it. This applies with especial force to religious education. All honest questions of the child concerning the supernatural elements in the Bible story should be honestly and fearlessly answered. However, the adult view should not be forced on the immature mind of the boy or girl until it can be understood and properly related to life.

What is true of the child in this particular is equally true of inferior and undeveloped races. It is futile to instruct them in those things that they cannot understand. It is necessary to remember always that what is the crudest superstition for an advanced age or a developed civilization may be the closest approximation to truth that is possible in a lower stage of intelligence or development.

(3) *The world of fancy must be limited.* A child may be encouraged in vivid fancy in one direction, and yet be held to the strictest account in another. For example, he may be allowed to people his imaginary world with all sorts of peculiar animals, but he must be held to strict account in regard to those that form the materials for his instruction in his course in nature study. There are many things that from the start he must know definitely and accurately, and here fancy can have no place. Normal children find little or no difficulty in making this adjustment.

(4) *Imaginary achievement must not replace real achievement.* It is important that the child should not believe that what he has created in fancy is already

an accomplished fact. There are many persons who have never succeeded in the world's struggle for the simple reason that they never could distinguish effectively between what they pictured to themselves as achieved and what they had actually accomplished. There are not a few of life's failures who have earned millions of dollars in their minds; who in fancy have been social reformers and leaders of men; who have written books, invented flying machines, and become captains of industry, through the mere thinking that these things were accomplished; in a word, who never could quite distinguish between the thought and the deed, between an ideal and its realization.

Summary. Perceptions are sensations to which meanings have been attached. Sensation informs the organism (1) of the world in which it lives, (2) of its own condition, and (3) of the adjustment that it makes to its world. Such information is secured by means of sense organs located in: (1) the eyes, ears, tongue and palate, nose, and skin; (2) the internal (especially the visceral) organs; and (3) the muscles, tendons, and joints.

The basis of apperception is the sum of past experience by means of which present experience is perceived, interpreted, or given meaning. Thus it will be seen that our perceptions grow richer as our experience increases. Some perceptions are true while others are false.

When the object of perception is not present to sense and we know it is not present yet we are conscious of the object, we say we have a mental image or an " idea " of it. Imagination is reproductive when it revives

former perceptions without essential change: it is productive when it recombines former perceptions in new ways. Imagination is valuable and should be encouraged on the part of pupils. Care should be taken, however, to see that the child does not confuse the real with the fancied, nor allow imaginary achievement to take the place of real achievement.

Definitions and Explanations of Terms Used

Sensation. Those elementary processes of consciousness that arise in connection with the stimulation of neurones in the cerebral cortex by impressions transmitted over sensory neurones from sense-organs.

Perceptions. Sensations to which meaning is attached give rise to perceptions. The meaning comes from past experience and has its origin in actual behavior.

Apperception, like perception, is the interpretation of the present experience in terms of attitudes gained from past experience.

False perceptions are perceptions that will not work out in our behavior. The immediate experience of the object will not agree with our future experiences.

Illusion. An illusion is a normal false perception; all normal persons under similar objective conditions will experience the same illusions.

Hallucination is an abnormal false perception. Only the person who is the victim of the hallucination experiences it.

Imagination. The consciousness of an object of sensory experience with the additional consciousness that this object is not immediately present to the

senses. This object of imagination is termed the *mental image* or *idea* in distinction from the percept.

Productive and reproductive imagination. The former recombines the elements of past experiences in new ways, the latter reinstates them without essential change.

QUESTIONS AND EXERCISES

1. Differentiate between sensation and perception. Illustrate.

2. List and illustrate the various classes of sensations, locating the sense organ which makes each possible.

3. What sorts of physical stimuli arouse the various classes of sensations?

4. In what ways do organic sensations differ from other kinds of sensations?

5. What is meant by the term "apperception"? How do you account for the fact that while one person may have great confidence in a certain hospital or doctor, another person may have only fear and distrust of the same?

6. Differentiate between true and false perceptions. Illustrate.

7. Differentiate between illusion and hallucination. Illustrate.

8. Differentiate between a percept and an image. Illustrate.

9. Differentiate between productive and reproductive imagination. Illustrate.

10. What is the educational significance of imagination? To what extent may the child's imagination be allowed free scope?

11. Find instances where a child's behavior towards an imaginary object differs from his behavior towards the real object. What differences do you notice?

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CHAPTER X

MEMORY AND BEHAVIOR

The wider use of the term "memory." The term "memory" in its widest signification is used to mean the retention of any experience in such a way that it changes behavior. This change in behavior is taken to be the fundamental test as to whether an individual remembers or not. If the individual learns through experience, if he is capable of education, then he remembers; if no such learning is possible, then there is no evidence of memory. Memory in this sense of the word is to be found in practically all animal life, probably even in its simplest form, the amœba. It becomes more and more evident as we go up the scale.

If a tuning fork is sounded near a spider, it drops from its web to the ground. If this same animal is tested day after day it finally responds to the stimulation no longer, but remains undisturbed in its web. It has learned to ignore the sound; in a sense it remembers its former experiences and acts accordingly. A more striking example of this sort of memory is found in the hermit crab, which usually avoids the darker parts of the aquarium in which it is placed, but which can be attracted into the shadow if food is put here. In seeking the food, the crab will go around a wire screen placed in its way; at length the presence of the screen alone is sufficient to cause the crab to move toward it and around it, although the food is no longer there. All vertebrates show through their behavior marked evidences of memory. Fishes, frogs, and turtles have been taught to find their way about simple mazes; cats, dogs, and monkeys readily learn to open puzzle boxes. Indeed, all animals that have

been observed in their free activities, or that have been tested experimentally, have given evidence that their behavior can be changed in some degree through experience.

The narrower use of the term "memory." As the term " memory " is more commonly used, it means more than the persistence of an experience in such a way that it produces a change in subsequent behavior. It generally signifies not only the retention of past experience, but the definite *conscious recall* of *an* experience and the *recognition* that it does belong to the past and not to the present. In this sense memory is synonymous with reproductive imagination (p. 158), except that the latter is not necessarily recognized as belonging to the past.

It is clear that many of the events in our past which have an influence on our present behavior are not remembered in this latter sense of the term. Often they have been entirely " forgotten "; we do not recall that we have ever experienced them — yet they may have left a residue that makes a profound difference in our conduct.

Recollection. When an event is recalled as belonging to the past, it is said to be *recollected.* This recollection may be very definite, or quite hazy, as the case may be. In the latter instance there is little more than the mere consciousness of familiarity, of " having been there before " or " having seen this before," that accompanies mere recognition. On the other hand, the past experience may be recalled in great detail and practically all of the circumstances connected with it brought back. The different degrees of recollection are often experienced by the individual who in later

life returns to the scenes of his boyhood. There are many objects that he recognizes only in the sense that they do not seem entirely strange; there are others that are dimly outlined through the haze of the years; while still others are recollected in minute detail.

Recall and recognition. Recollection is the culmination of conscious memory. It is preceded by *recall* and *recognition*. Usually recall implies recognition and a certain degree of recollection, but not always. I may recall an event without recognizing that it has been a part of my past experience, and I may recognize something that I have been unable to recall. That is, I know it when it is presented, although I was not able to bring it into my consciousness unassisted. As an example of recall without recognition may be cited the coming to mind of an expression, or the executing of an act, which has formed part of an earlier experience, but which may seem quite spontaneous and original. We sometimes use the language of a text that we have studied in school, or an apt phrase that we long ago committed to memory, and think that we have just invented it.

While as a rule recall is accompanied by recognition, recognition often takes place without recall. We are constantly recognizing objects as they are presented to us, although we could not recall in any real sense our earlier experiences with them. I have forgotten the name of the man I was introduced to yesterday, but when a friend asks me, "Was it Thomas?" I at once recognize that this is the correct name.

Memory and imagination. As has been suggested, the ability to recollect is closely related to the ability

discussed in the preceding chapter under the head of "imagination." Both productive and reproductive imagination involve the reinstatement in consciousness of certain elements of past experience in the form of mental images or ideas. The chief concern of the present chapter is with the conditions that favor the retention and revival of images and ideas.

Impression and association. The ability to retain an experience and to recall it when needed depends upon (1) the *strength of the impression* that the experience has made upon consciousness; and (2) the number and kind of other experiences with which it has been connected or *associated* in unconsciousness. Strength of impression may be regarded as primarily responsible for the *retention* of the experience, association for its *recall* or *recollection.*

The conditions which favor retention and recall may be summed up under the following general principles, all of which have important educational implications.

1. *The laws of primacy and recency.* The laws of primacy and recency may be expressed as follows: Other things equal, the first and last events in a series of related experiences make a deeper impression and are more likely to be retained and recalled than the remaining events of the series. I remember the first day of my visit at the home of my friend better than the days that followed. I shall never forget the port at which I landed on my first visit to Europe, although many of the cities that I later saw are now very indistinct in my memory. These instances are illustrative of the principle of primacy. In a quite analogous

fashion, the terminal event in a series is likely to be retained in memory. The last class that I attended as a senior in college has left an impression on my mind that has never faded out. I can remember no other so distinctly, and for most of them I have no memory at all. An obvious expression of the operation of recency is the fact that the events of yesterday are more easily recalled than the events of a week ago, and the latter are more easily recalled, as a rule, than the events of a year ago. Educationally, however, the principle is chiefly important in the importance that it gives to the closing events of a series of related experiences.

A quite practical application of the principle of primacy is suggested in the saying, "First impressions are lasting." The beginning of a school year, the beginning of a school day, the beginning of a new subject of study, the introduction of the pupil to a great poem, a great picture, a great truth of science: these occasions present possibilities for capitalizing in the interests of education the advantages of what has been called the "privileged first impression."

In his book, *The Lesson in Appreciation*, Dr. F. H. Hayward gives especial emphasis to the importance of the first impression in the study of the masterpieces of literature and art. The "mind and the mood" of the pupil, he says, should be carefully prepared in advance of the occasion when the masterpiece is introduced. Information that will help in appreciating the poem or the picture should be given beforehand; as far as possible a mood of expectancy should be developed through subtle suggestions to the effect that something fine and beautiful will soon be forthcoming; and every precaution should be taken that distractions or interruptions do not creep in to mar the effectiveness of the occasion when the masterpiece is actually presented.

Another important suggestion which follows somewhat as a corollary from the principle of primacy is to plan very carefully for the first day of the school year. The end sought here is to have the first day's work typify the active and aggressive growth that one would wish to have characterize all the days that follow. The more quickly the pupils can settle down to the regimen of work and the more smoothly the "machine" runs from the very outset, the better will be the chances of realizing this ideal. If, in every lesson of the first day, something of real significance is taught and learned, not only may the advantages that primacy gives to learning be capitalized, but the momentum of the good start will make it much easier than it would be otherwise to have the work of the subsequent days of a high order.

The same principle holds throughout the activities of the school. *In teaching and learning all beginnings are important.*

While the principle of recency has fewer applications to education than the principle of primacy, it is not without significance. The place that is accorded to graduation exercises is an implicit recognition of the fact that the closing events in a series of related experiences have a distinctive value. Other applications will readily occur to one who wishes to test the validity of psychological principles in helping one to teach more effectively.

The teacher, for example, may well take a leaf from the experience of successful public speakers who always take very great care with the closing sentences of an address. The teacher will find it equally valuable to "round out" each lesson in such a way that the most important things to be learned may have the advantage of this closing emphasis. In a similar fashion the final lesson of a course may usually with great profit be given over to a discussion and summary of the phases of the course that have the very greatest significance.

2. *The law of vividness.* Within a series of related experiences, those that are most vividly impressed have a special advantage in connection with retention and recall. Sometimes vivid impression means mere intensity of sensory experiences. I remember last week's severe thunderstorm in part because the lightning and the thunder gave rise to very intense visual and auditory sensations. I remember many details of my experiences years ago with an ulcerated tooth because of the intense sensations of pain. I recall a day's journey along the shores of the Mediterranean with particular reference to the intense blue of the sea. A long midwinter trip by sledge across a frozen bay of the north I still recall because of the intense cold.

In general, however, experiences are vivid not because of the intensity of the sensations that comprise them but because they "stand out" as novel or unusual against the background of the routine and the customary. The mail plane usually flies high over my house, but to-day it flew so low that it seemed only a few hundred feet above me. The memory of this event I shall probably retain for some time. Among the thousands of students who have been members of one's classes over a period of thirty years there are obvious limits as to the number that one is able to recall. Some of those who do "stand out," however, are likely to be those who differed in some marked way from the group as a whole, whether for brilliance or stupidity, for coöperation or interference, for pleasing ways or the lack of them. And so of the formal lessons that one has learned in school: a few stand out because they

were presented by an artist-teacher in a dramatic way that riveted attention, compelled interest, and insured understanding; others, perhaps equally or even more important, have been learned, it is true — but through no virtue of a vivid impression!

The principle of vividness as applied to teaching and learning has obvious limitations in the fact that it is only the unusual experiences that can be given this advantage. There are some occasions when one may employ devices that provide vividness of sensory impressions: the use of colored pictures in the primary grades; the use of colored crayon in writing certain words or parts of words which one wishes to have stand out; and, perhaps most important of all, an effective use of pause and emphasis in oral teaching. Usually, however, vividness in teaching means breaking the routine at appropriate points by a special, perhaps even a dramatic, treatment of very important topics.

In the book already referred to, Dr. Hayward suggests that a "Red-Letter Lesson" be given at not too frequent intervals. Each lesson of this type would deal with something of unusual significance: a great work of art; a great historical character or event; the discovery of a scientific truth of far-reaching significance; the story of an epoch-making invention. It is such lessons, Dr. Hayward contends, that should be given the advantage that attaches to vivid portrayal. In one's memories of school days, he says, these are the events that ought to stand out sharp and clear. Not everything can be given this advantage, so why not select for these occasions the most significant lessons that we have to teach?

3. *The law of frequency or repetition.* It is clear that there are many lessons to be impressed which cannot, in the nature of things, be given the advantage of primacy, recency, or vividness. Throughout the

entire field of education the Biblical injunction must be the mainstay of both teacher and learner: "For precept must be upon precept, precept upon precept; line upon line, line upon line; here a little and there a little." Most of the ideas employed in the control of conduct are retained and applied because the experiences upon which they rest have recurred again and again in our lives.

I have a request to suggest a suitable candidate for a teaching position. I try to remember one of my former students who will fill the bill. I recall Mr. *A.* and Mr. *B.*, both of whom stood out as exceptional students. Here the factor of vividness is at work. But both of them are already in better jobs. I recall Mr. *C.*, who stood out because he was very tall and very broad (again vividness); but I also remember that his exceptional qualities of stature and breadth were physical rather than mental; he does not seem to be the man I am looking for. Then Mr. *X.* comes to my mind: not remarkable in any way, but a good man for this particular post. Why had he made an impression? In this case, very largely because in his student days he had served as a part-time clerk in my office and I had had frequent opportunities to talk with him.

We have suggested that some of the lessons taught in school may be impressed through vivid presentation, but that most of them are impressed by repetition; as the commonplace phrase has it, we learn them "by main strength." For many long years I had no occasion in my business to extract the square root of a number, but the occasion came eventually, and under such conditions that there was no time to "consult authorities." I wondered whether I should be equal to the task and it was almost with childish glee that I got the right answer on the first trial. It was not the vividness of the original impression that had led to its

retention through the years and had thus made possible its revival in the time of need. It was rather the repetitions that an old-time teacher had insisted upon — repetitions that seemed to me at that time the acme of what we now call " overlearning."

So significant is the factor of frequency that most of the experiments in the field of learning have had as their objective an accurate determination of the number of repetitions that are needed to insure effective mastery, the amount of time that should be given to repetitive exercises at various stages of the learning process, the amount of material to be covered in a given unit of repetition, and similar questions. The more important findings of these experiments will be set forth in the following chapter on Economy in Learning.

4. *The rôle of association.* While retention depends largely upon the strength of impressions, whether secured through primacy, recency, vividness, or frequency, or through a combination of these factors, the recollection and recall of the retained impressions depend primarily upon *association* — that is, upon the connections that have been made among them.

For example, I could not have recalled the former student whom I recommended for the post referred to above if my impressions of him had not been made strong enough through repetition to insure retention; but even then I should probably not have recalled him if something in these retained impressions had not been connected in some way with the situation that confronted me at the time. If I had been asked to recommend a janitor or a bellboy or a bank clerk, it is

altogether unlikely that I should have thought of the several names that came to mind when I was asked to recommend a teacher. Similarly, regarding my memory of the deep blue of the Mediterranean, the vividness of the earlier experience was undoubtedly responsible for my retention of the image, and retention makes possible its recollection; but the image is not recalled unless something in my present consciousness (something that I see or something that I am thinking about) suggests it through association.

Associations may be merely sensory resemblances. Under a very clear sky Long Island Sound is deep blue in appearance, and often in looking out upon it I recall the still deeper blue of the Mediterranean; a sharp clap of thunder to-day revives my memory of the severe thunderstorm last week; and so on. Sensory resemblances, however, are not nearly so important in association and recall as are resemblances in *meaning*.

An association through meaning may be illustrated by the fact that I recalled some of my former students when I was asked to recommend a teacher. The word "teacher" has for me a quite different set of meanings than have the words "janitor," "bellboy," "bank clerk." With the idea "teacher" (and an idea of this type is simply a bundle of meanings) I associate many activities and many persons, and among the persons thus associated with the idea are my former students who have become teachers.

When I remembered the process of extracting the square root of a number, the association that evoked the memory was an association of meanings, not a set

of sensory resemblances. The formula that I was working with contained the symbol $\sqrt{a}$. I had already found the value of a, but I could proceed no further with my work until I had made the computation that the radical sign represents or means. There is, of course, no *sensory* resemblance between the radical sign and this process of computation!

Even when I recall the journey along the Mediterranean shores, the chances are that the association evoking the memory will be a "meaning" association and not a "sensory" association. The blueness of the Sound may recall the blueness of the Mediterranean; a more likely "evoking agent," however, would be the idea of a vacation which suggests in turn my vacation in Europe which, in its turn, suggests the journey in question — the blueness of the sea not coming into the picture at all as a causal factor in my recollection.

In teaching and in learning the most important of all tasks is to organize experience in the form of ideas or meanings which will have as many connections as possible with other ideas or meanings. On the intellectual side, educational growth is very largely a refinement, expansion, and further association of meanings.

Words owe their significance to the fact that they carry meanings and thus enable us to communicate our experiences and especially to learn from the experiences of others; but words are not the only bearers of meanings. We "know" the objects of the external world because of what they mean to us. The meanings of both words and objects, as we have seen, have their roots in actual behavior (see pp. 147 f.) and our

knowledge of them is useful to us primarily because it helps us to direct our behavior more effectively.

The educational problems involved in the development of meanings will be discussed in Chapter XII, Behavior as Related to Meaning and Thought.

5. *The significance of a conscious determination to remember.* One of the most important practical principles underlying the retention and recall both of sensory experiences and of meanings is the " will to learn," or, to put it in another way, the presence in consciousness of a definite intention to remember what one is experiencing at any given time. Experimental investigations have abundantly demonstrated the potency of this " will to learn."

Dr. G. M. Whipple, in his very helpful monograph, *How to Study Effectively*, gives a clear-cut illustration of the influence of intention in learning. He had devised an experiment to test the relative efficiency of auditory and visual impressions in learning a series of nonsense syllables. The technique of the experiment required him to read the syllables over and over again to a subject until the latter had learned them "by heart." When this point was reached, Dr. Whipple was greatly surprised to find that he himself, who had received the same number of impressions not only through the ear but through the eye and through the vocal muscles, could not repeat them in the right order. The difference lay, of course, in his mental attitude as compared with that of the subject. The latter deliberately set out to learn the series of syllables; the experimenter had only the duty of reading and speaking the syllables, not the duty or the motive of mastering them.

A prominent teacher of law is said to give this advice to his students: "Read each case as though you were absolutely certain that every record of the case would be destroyed immediately after you have completed your reading." The object here is to encourage the student to learn with the intent to remember what he is learning.

One may easily test for oneself the validity of this principle. If one learns with the distinct intention of making mastery permanent one will find oneself looking for ways both of strengthening the impressions to insure retention and of multiplying associations to insure recall.

Summary. We have not a memory but many memories. Experiences may be recollected, recalled, or recognized. An experience cannot be remembered unless it has been impressed upon the nervous system and associated with other experiences. Those experiences which are most firmly impressed and readily recalled are those which were first or last in a series of related experiences, those which were vividly impressed, or those which were most frequently experienced. Recall, however, is primarily dependent upon the associations that have been made among impressions. Those impressions are likely to become associated which are related to each other in sensory quality and, more especially, in meaning.

Definitions and Explanations of Terms Used

Memory. In the most fundamental sense of the term, memory signifies the retention of any experience in such a way that it modifies subsequent behavior; in the narrower and more common use of the term, it signifies the conscious recall of any fact or event, with the added consciousness that this fact or event belongs to our personal experience.

Retention. The holding of an impression so that it may be recalled.

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Recall. The revival in consciousness of a past experience.

Recognition. This term signifies that the present fact or event is known; that is, it does not seem strange; we know how to behave in relation to it; it is accompanied by a "feeling of familiarity."

Recollection. The fact or event that I recognize is revived in recollection with some of the circumstances that originally accompanied it and with a distinct placing of it in past experience.

Impression. This term signifies the "stamping in" of the original experience in such a way that it persists for an appreciable period of time.

Association. This term signifies the connection of the impressed experiences with other experiences in such a way that one tends to recall the other.

Laws of impression. The laws of impression include the laws of primacy, recency, frequency, and vividness.

Laws of primacy and recency. Those experiences that come first and last in a series of related experiences are more likely to be recalled than the intermediate experiences in the series.

Law of frequency. The more often experiences are presented together, the more likely they are to be recalled together.

Law of vividness. The more vivid or intense the experience, the more likely it is to be recalled.

Law of association. Those experiences which resemble each other in sensory quality and, more especially, those which are related to one another as regards meaning tend to become associated.

QUESTIONS AND EXERCISES

1. Define memory as the term is used in the narrower psychological sense. Compare memory with perception and imagination, giving examples.

2. Distinguish between recognition and recollection.

3. Distinguish between impression and association.

4. To what causes might defective memory be due?

5. Upon what factors does retention depend?

6. State the laws of impression. Illustrate each.

7. What determines what experiences are associated? Illustrate sensory resemblance; resemblance of meaning.

8. What is meant by a "conscious determination to remember"? From your own experience illustrate failure to remember because of a lack of "learning with intent to remember."

9. Experiment with a group of persons, giving them a word such as "party" and noting the first word which comes into their minds after hearing the word. Try to explain the association by means of the laws of impression and association.

10. Secure a colored picture of fair size (for example, fifteen by twelve inches). This should depict some simple scene and contain a reasonable number of details (too many will cause confusion). Show this picture to adults and children, allowing them to observe it for one minute. First ask the observer to describe what he has seen; then ask questions, some of them misleading. Note the source and character of the errors.

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CHAPTER XI

ECONOMY AND TRANSFER IN LEARNING

Since all advanced stages of learning are based on memory and association, it is evident that correct methods of learning depend on the manner in which impressions are received and joined together. It is not a matter of indifference how we learn. Many investigations have been made to determine the most advantageous methods of learning, and it has been shown that it is possible to save both time and energy by certain definite procedures. The most important of these will be discussed in the present chapter.

Learning by wholes *vs.* learning by parts. A common practice for a person who is committing a poem or a selection of prose to memory is to learn it bit by bit. In the case of the poem, he studies the first stanza until he can repeat it without the aid of the book; then he studies the second stanza in the same way, then the third, and so on, until he has finished the task. In the case of the prose selection, he follows a similar method, learning a few sentences at a time. This method of learning has been technically called the *Part Method* because the learner commits to memory piecemeal.

It has been conclusively shown by Steffens, Meumann[1], and others that in general this is a wasteful

[1] Ernst Meumann (1862–1915) conducted an experimental laboratory at the University of Zürich where he experimented with regard to

method of memorizing, and that it is a saving to learn by the *Whole Method.* When this latter method is employed, the poem, or the prose selection, is studied from beginning to end each time until the task is completed.

The advantage of the Whole over the Part Method is to be explained largely by the fact that, in studying anything that has meaning, correct associations are formed only when each part studied is connected with that next following. In the case of the Part Method, however, the last line of the stanza of poetry, for example, is not connected with the first line of the stanza next following, as it should be according to the sense, but it is joined with the first line of the same stanza. Thus the proper sequences of stanza to stanza are not fixed in mind. One may be able to repeat each part learned with absolute correctness and yet not be able to join the parts together, nor to remember the order in which they come.

Experimental evidence favors combining the two methods. The Whole Method has two disadvantages, however, which make certain modifications in procedure necessary. In the first place, this way of learning is likely to discourage the immature pupil. The very bulk of the task depresses him. He studies the selection over again and again, and perhaps cannot then repeat a single line correctly. It seems as if he were making no advance. The remedy for this obvious difficulty is to habituate him from the start to the Whole Method, to show him that in the end it is easier than the Part

whole and part methods of learning as well as making other studies in memory. He later occupied a chair in the University of Hamburg. Among other writings he published in 1913, a book which has been translated into English and published under the title, *The Psychology of Learning.*

Method, and that it accomplishes more satisfactory results.

In the second place, it almost invariably happens that certain portions of the material that is being studied are more difficult than are others. As a result, the easier portions are learned long before the more difficult, and yet if the Whole Method is strictly followed, these parts that have been learned must be studied together with those that are harder. For this reason, *it is desirable to study the whole selection until the easier parts are mastered; then to spend some time in mastering the more difficult portions; and finally to fix the entire selection in mind by the Whole Method.*

While the superiority of the Whole Method has been experimentally established in that type of mastery known as "learning by heart," or thoroughly *verbatim* memorizing, the same principle may well be employed in those learning processes where one does not expect *verbatim* mastery but rather a clear understanding of what is being studied. Thus in studying an assignment covering a well-organized unit of material, such as a chapter in a textbook, it is well to read the chapter through and then read it again and perhaps yet again as a whole. Then the more difficult sections should be gone over separately.

It is reasonable to carry this principle even further. Whenever it is possible to get at the outset a bird's-eye view of an entire subject or course of study, it is likely to help in the subsequent mastery of the smaller units. The general procedure may be stated as follows: *First, a view of the whole; then a detailed study of the parts; finally a summarizing study of the whole.*

The best length for learning periods. Another important question relating to the technique of learning may be stated as follows: "If you had two hours that you could devote to the study of a certain lesson, would it be more advantageous to spend the entire time at one sitting, or would it be better to divide the time spent into several; four, for example, allowing thirty minutes for each period of study?" When the question is put in this way it may be difficult to give an answer for each individual case. The thirty-minute period will undoubtedly be more advantageous for young children, and probably for mature students who "settle down" to their tasks with little loss of time; for those, however, who spend ten or fifteen minutes in "warming up" for their work, short intervals of study are distinctly disadvantageous. In general, for a task extending over a long period of time, it is better to distribute the learning among several study periods. For example, it is probably desirable to have in the lower grades two rather brief periods for number work daily rather than one long period. In the high school it is usually advantageous to extend a study over the whole year with shorter periods than to crowd it into one semester with long periods. There is little doubt that in most instances *the extended course is better than the one that is finished in half the time, although the same number of hours may be devoted to the course in each instance.*

The reason for the superiority of the work that is extended over a considerable period lies chiefly in the fact that this added time gives the material learned an opportunity to be fixed in mind through wide associations. The longer it is present as a part of the

mental content, the greater is the opportunity for establishing many associations that relate it to other material which is being learned and to that which has already been mastered.

The importance of recall in learning. In attempting to master an assignment the learner often turns away from the book that is before him to see how much he is able to recall. This practice is justified by sound psychological principles. It has been found by actual tests in the laboratory that *effort to recall* is a great aid in learning. It should certainly be practiced much more than is the custom. After one has read a chapter through it is well to close the book and try to reconstruct the thought of the chapter in one's own words. The same procedure should be followed when one is taking up the more difficult sections by the Part Method. Indeed, the earlier efforts to recall should indicate to the learner the points at which the Part Method should be applied. Many a pupil believes that he has mastered a lesson when he has read it over once or twice. As a matter of fact, his learning is likely to be most superficial because he has not taken the trouble to discover by means of attempted recall just where his strength and his weakness lie.

Recall is valuable for two reasons. In the first place, as has already been said, it shows the learner where the weak places in his task are, and in the second place active recall tends to strengthen the impressions and to establish firm associations — probably because it encourages "learning with intent to remember." (See p. 179.) It is a great economy in learning to use the spare intervals, periods too brief for systematic study, in recalling what has previously been studied. The utilization of these odds and ends of time makes an important total in the aggregate.

The value of the recitation and of systematic reviews. The value of the " review " is closely related to that of recall. One of the chief functions of the recitation period is not to discover how much the pupil knows and to assign to him marks, but to show him where his knowledge is weak and his understanding slight. It is further advantageous as a means of emphasizing the important facts and of reënforcing useful associations. In other words, by means of the recitation the teacher aids the pupil to recall those things that it is necessary for him to fix permanently in mind. Hence, during the recitation the pupil should be encouraged to recall and restate the lesson in large units or " topics." A " pumping " recitation has but small value.

The importance of systematic reviews can scarcely be overemphasized. Every large unit of a course should be followed by a review lesson, and every course should conclude with a series of such lessons. (See p. 186.)

Interference in learning. Impressions and associations formed at various times tend to interfere with one another. If I have just finished learning one selection of poetry and at once start to commit another, there is danger of confusing the two selections. This fact of interference has already been discussed in a preceding chapter in another connection. It is to be remembered that the chance for interference is greater in proportion to the incompleteness of the learning. If I have committed the poem so that I can readily remember it and permanently retain it, then my learning of other selections subsequently will not interfere

with my retention of the poem first learned. On the other hand if I have just barely mastered the poem, it may easily become confused with what I subsequently study. (See the discussion of interference in habit formation, pp. 132 ff.)

Again the possibility of interference is greater in proportion to the closeness of the periods of learning the first and the second (or interfering) selection. I am more likely to confuse two poems when I study one directly after the other, than if there is a time interval between. For this reason it is always well to leave a brief time that is unoccupied between successive periods of study. This gives the opportunity for the fixing of the materials just learned.

Finally, interference is directly proportionate to the similarity of the materials. I am more likely to confuse two dates in history than I am a date in history and a formula in mathematics. For this reason it is probably not well to have subjects that are alike follow one another directly in the school program.

Interference seems to be due to two chief causes. In the first place a certain length of time seems to be required in order that the memory impressions may become established. This is irrespective of the associative connections into which they enter. In the second place, it is easily seen that since effective recall is largely a matter of proper associative connection, it is necessary that the correct associations be perfectly free to form themselves without entering into competition with other associations that are in the process of formation. The richer the meaning of what is being learned, the richer is the possibility of forming wrong associations, or of breaking up those associations that have just been formed.

The laws of forgetting; the great importance of "overlearning." To understand the facts of memory

it is equally essential to understand the facts of forgetting. It has been definitely determined that *we forget what we have learned very rapidly at first and then much more slowly.* If we are studying something in which there is little meaning, in which we rely on impression very largely and on association but slightly, a large amount of the material learned will have faded from our minds in the first few hours after we have stopped the learning. What remains after this leaves us much more slowly. In memorizing something that has meaning, we find that we forget it less rapidly, although the fact still remains that the rate of forgetting is more rapid at first than it is later on. It has been found that if the subject studied is to be remembered for any length of time without a large loss in the first few hours, *it is necessary to study it beyond the point of merely learning it for present recall and recitation.* In other words, if the person wishes to retain what he is learning, he must go over it again and again, even after he is convinced that he has mastered it. *To " overlearn " in this sense is a cardinal principle of effective study.*

Rote learning *vs.* meaningful learning. Most of our learning does not consist in committing to memory *verbatim* the materials of study. It is rather learning by the " sense," or " meaning." (See pp. 147, 207 ff.) It is necessary in this case to determine what should be held in mind and what may be skimmed over and forgotten. It must also be remembered that *rote memory is never to be justified in itself, but only insofar as it can be used in connection with something that has meaning.* If I commit dates in history, lists of

rulers of Europe, and presidents of the United States; if I learn to name the principal bones of the body and the counties in the state in which I live — this knowledge has value only insofar as it relates itself to something that has real significance. Dates in history are useful because they mark off important epochs and help us to keep in mind the time relations of momentous events. Inasmuch as these time relations often represent cause and effect, the time associations help to hold events together in a very important relationship. Presidents and monarchs have no importance as mere names; they are valuable only insofar as their relation to their time and their connection with the events of their day are significant. The names of the bones of the body are worthless bits of mental furniture unless their use is known. The counties of a state are of no importance to the learner unless he sees their connection with the economic and political conditions of the state. *There is no learning that is valuable which does not immediately or ultimately connect itself with conduct or behavior;* and rote memory, if considered for itself alone, is a waste of time. On the other hand, to have important and meaningful associations firmly fixed in thoroughly memorized statements or formulæ is an asset of unquestioned value, and to "know by heart" at least a few of the great poems and songs and masterpieces of prose composition is to have resources for enjoyment and inspiration that one can draw upon at any time.

The value of mnemonic devices. It has been found by experiment that it is from *eight to ten times as easy* to commit to memory significant material as material

without meaning. It is therefore desirable whenever possible to introduce meaning into what is being studied. This has resulted in the use of various tricks in learning and in the elaboration of so-called *mnemonic* methods of aiding the memory. The often advertised methods of " improving memory " are generally of this character. The trouble lies in the fact that what is learned is usually held in mind by purely artificial associations — as, for example, by arranging a list of names in such a way that their initial letters will spell a word or phrase. The associations thus formed are not of real significance and they must often be unlearned before the significant associations can be established. For this reason mnemonic devices should be employed with great caution and only when all other methods fail.

The " warming up " period in learning. It is a fact of common observation that much time is often lost by the learner in starting upon his task. It may take him from five minutes to half an hour to " warm up " to his work. Indeed, some persons habitually " dally " along, and never get thoroughly engrossed with the task at hand. Such individuals find their attention easily distracted, and they let their minds wander away from their studies at the slightest pretext. Efficient learning is always a matter of concentrated attention. It therefore follows that the person who can readily *control* his attention, who can plunge at once into his work, has a decided advantage over the person whose adaptability is less. This adaptability is partly a matter of individual make-up, but largely the result of the formation of correct habits and ideals of work.

It is improvable to a high degree, and the teacher may well take time and pains to demonstrate this fact to the learner. Encourage always a quick settling down to the business in hand.

The most favorable rate of learning. The question of the rapidity of learning is important from the standpoint of mental economy and efficiency. Is it well to go over the material deliberately or with haste? This depends upon at least two things: (1) the general disposition or type of the learner; (2) the nature of the material.

In the first place, there are certain individuals who seem naturally to learn more rapidly than do others. This rapidity may be due either to carelessness or to the mental alertness of the learner. If the rapidity is the result of carelessness, the learning is only apparent, not real, and the learner should form the habit of studying more deliberately; if, on the other hand, this rapidity is due to superior intelligence, the learning is likely to be real and rapidity should be encouraged. *The rapid learner is not of necessity the rapid forgetter. Slowness may be due to stupidity as well as to care and accuracy.*

In the second place, the learning should be more rapid with material that is easy to master than with difficult material. The difficulty depends on several factors. If the subject of study is unfamiliar, progress will not be so rapid as if it were well known; simple narration or description is not so difficult to master as exposition, hence we expect that novels and short stories will be read much more rapidly than essays or books dealing with history or science.

The "transfer" of the results of learning. Upon the question of the possibility of transferring what has been learned from the situation in which it has been mastered to another situation, there has been a great deal of controversy which has led in recent years to careful experiments, especially regarding the extent to which habits and skills may be transferred from one situation to another. Much work still needs to be done in this field before we may confidently lay down general laws, but, pending thoroughly valid conclusions, certain hypotheses for the guidance of practice may be drawn from the facts now at our command.

(1) *Transfer through identical elements.* In the first place, it has been shown by experiment that habits built up as responses to certain situations may spread *as habits* to other situations if the latter have numerous or significant *points of identity* with the former. By the spread of habits "as habits," we mean that the response in the new situation is thoroughly automatic and mechanical; the individual does not have *consciously* to lift the old habit out of its old setting and apply it to the new situation.

Let us suppose that the child has formed in connection with his school life the specific habits of prompt and regular attendance. He goes to school on time and he goes each day. He does not think about these things, but when the time comes for going to school, he picks up his books and starts off. It is needless to say that these habits of promptness and regularity would be most valuable to him in his later life, but will they spread to out-of-school situations? It is probable that in most cases they will, for the school situation is a *work* situation, a *duty* situation, and the employment which the pupil enters later is also likely to appeal to him as possessing these characteristics. The two situations present

points of identity, and the habits common to one are likely to become common to the other. If the school should lack these characteristics, the habits would tend to remain specific to the school situation.

Too much reliance must not be placed, however, on the chance that situations will possess points of identity. The experiments that have been made show that a *very slight* change in the situation *may* serve to prevent a useful habit from spreading. Nevertheless, it is well to make the school situation resemble the situations that are to be met in later life in all possible and legitimate ways. In general, the more closely school resembles actual life conditions, the more likely it will be that the valuable habits to the building of which the school devotes so much of its energy will be really important factors in the pupil's later life.

(2) *Transfer through "ideals of procedure" and "concepts of method."* It is much more essential in insuring the spread of useful habits to develop in the pupil an appreciation of the importance and value of the habits and a definite idea of looking about him to see when and how these habits may be employed in new situations. This is similar to Judd's[1] theory of the *generalization of experiences.* It was pointed out that habits tend to spread *as habits* (that is, on the mechanical or automatic level) only when situations possess points of identity. But it is always possible

[1] Charles Hubbard Judd (born 1873) is one of the leading American psychologists. For the past twenty years he has been Director of the School of Education in the University of Chicago. He translated *Outlines of Psychology* by Wundt and is the author of several books in this field, including *Genetic Psychology for Teachers*, *Psychology of the Secondary School*, and *The Psychology of Social Institutions.*

to transfer a habit from one field to another through a conscious process. Here the activity is no longer mechanical and automatic; it has been raised into the clear light of consciousness, and the great importance of consciousness, as has already been pointed out (p. 13), *lies in the fact that it enables us to meet new situations.* From one point of view, the function of consciousness is *to select from our stock of specific habits, a new combination of responses* that will enable us to meet the new situation effectively.

Thus, while habits of promptness and regularity of work *may* be transferred on the automatic level from the school situations to the situations of later life, it would be folly for the teacher to depend upon this chance when he can make the "spread" much more certain by developing ideals which will impel the pupil to be prompt and regular in every situation which he may meet. In the former case, the transfer is limited to the automatic level; in the latter case, it operates consciously and explicitly; the individual has made promptness and regularity *ideals* — he has endowed them with the feeling elements (p. 61) which insure their control over conduct. Beyond this, he has an *idea* of what promptness and regularity mean and how to achieve these virtues. In other words, he has a definite *concept* of the desirable method of procedure.

In order, then, that a habit may have *general* value, it must be one that can in whole or in part be evoked by many situations; or it must be one from which certain ideals of procedure may be derived and applied to many different forms of behavior.

This limitation of the activity of specific habits has far-reaching consequences in education. Because the pupil habitually attends to his work in nature study, it is not to be inferred that he will necessarily give an equal measure of attention to the lesson in history. He is more likely to give attention to all of the school subjects, if he is led to recognize the value of forming these specific habits of attend-

ing. He may be orderly and neat in his written work in English and still hand in disorderly papers in arithmetic and geography. Indeed, he is likely to do this unless neatness is insisted upon in all subjects or unless neatness has been made a general ideal. The child may as a matter of habit be obedient when his father is present, and quite the reverse when left with his mother. He may keep strict order under one teacher and be the center of disturbance in the next class. Loyalty to constituted authority is the general ideal that must be developed here; otherwise the habits of obedience formed in one situation will be of negligible value in other situations.

Summary. The various facts concerning economical learning discussed in this chapter may be summarized as follows: —

1. All material, no matter what its nature, should be gone over carefully and deliberately several times until it is clearly understood, and then the rate of learning may be increased in accordance with the character of the material and the type of the learner.

2. The material should be studied by the *Whole Method* until the easier parts are mastered; then the attention should be given to the more difficult parts *one by one;* and finally the *whole* should be studied until it is well fixed in mind.

3. The study should *not end* with the *first* successful attempt to reproduce what has been learned, but it *should continue for some time* after this point has been reached. It is economical to overlearn if one wishes even relatively long retention.

4. During, and immediately after, the learning, *recall* should be practiced and the weak parts in the learning discovered and strengthened. It is well also at spare intervals to recall to mind what has been previously studied.

5. The chances of retention are increased if one learns with a determined intention to remember "for all time" what is being learned.

6. If the material to be learned is of considerable length, it is economical not to attempt to master it at one sitting, but to *divide the study into several sittings.*

7. Whenever it is possible, the learning should be in terms of the meaning of the material, since *learning by rote without regard for meaning is very slow and difficult.* Thoroughly automatic mastery, however, is of very large value in connection with many important associations and absolutely indispensable with some.

8. It is highly important that the learner habituate himself to *begin at once* with his task. In other words, he should facilitate the adaptation of his attention in all ways possible.

9. A habit to have general value must be one that can in whole or in part be evoked by many situations; or it must be one from which ideals of procedure may be derived.

Definitions and Explanations of Terms Used

Whole Method. This term signifies the learning of organized materials by going over a complete unit again and again until it is mastered. It is contrasted with the *Part Method* in which the material is mastered piecemeal.

Recall. The term is used in this chapter to signify the practice of attempting to bring back to mind that which is being learned, in order that mistakes may be

noted and the progress that is being made discovered, and in order that " learning with intent to remember " may be stimulated.

Mnemonic methods of learning. This signifies the use of devices to give meaning to memory material when no such meaning exists. As a rule mnemonic aids in learning are dangerous because the meanings attached to the learning are of little value in other situations.

Adaptability of attention. By this is meant the ease with which the learner concentrates his attention on a given task immediately upon undertaking it. Some individuals spend a long time in " warming up " to their work. In such cases they adapt their attention slowly; others have readily adaptable attention. The adaptability of attention may be very greatly improved in most cases by continued effort under guidance of an ideal.

Concepts of method, ideals of procedure. These are agencies involved in the conscious transfer of specific habits from the fields in which they have been formed to other fields.

QUESTIONS AND EXERCISES

1. Contrast the Whole and Part Methods of learning, and state under what conditions each may profitably be employed. (The reader would do well to test the relative merits of each of these methods for himself. Two poems of equal length, equal difficulty, and equal interest should be chosen. One should be learned either line by line or stanza by stanza; the other should be learned by rereading and reciting it as a whole until it is mastered. Note carefully the number of repetitions required in each case, and the amount of time spent upon the learning. It is also well to try the same experiment with prose selections.)

2. In connection with the tests suggested above, the question of the best time interval for learning may also be investigated. In comparing two methods, of course, the intervals given to repetition should be equal, but when the learning of the two poems has been completed by practicing, say, through a number of ten-minute periods, try two other poems with twenty-minute periods.

3. The importance of recall may be tested by learning two selections of the same length, difficulty, and interest, *reading* one repeatedly until it has been thoroughly mastered, and reading the other to the point where it can be partly *recited*, then continuing by *recitation*, referring to the printed page only when it is necessary to refresh the memory. Note carefully the time consumed and the number of repetitions essential to mastery. Needless to say, the time intervals and the general method of procedure (that is, by parts or wholes as the case may be) should remain constant in the two tests that are to be compared.

4. What is meant by "interference" in learning?

5. What resemblances, if any, can you detect between habit building and memorizing? What differences, if any?

6. Why and when is overlearning desirable? How does forgetting vary with meaningful and meaningless material?

7. The significance of meaning and organization to learning may be clearly seen by comparing the learning of a series of nonsense syllables with the learning of the same number of syllables forming a group of meaningful words. The result is so obvious, however, that one does not need the experiment to be convinced of the value of organizing materials into meaningful units.

8. What is meant by "mnemonic devices"? In your own experience have you found such devices to be useful? If so, can you explain the secret of their utility?

9. Note, in the tests suggested above, the length of the "warming up" period. Does it vary in your own learning, and under what conditions? What means, if any, do you employ to shorten the period?

10. In your own learning, have you noted whether the rate or *tempo* of repetition is a variable factor? (This may again be tested

by experiments similar to those discussed above. Again it should be insisted that, in testing one of these factors, all others must remain constant.)

11. What steps may the teacher take to improve methods of learning among his pupils?

12. Illustrate what is meant by transfer through identical elements; by transfer through ideals of procedure.

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CHAPTER XII

BEHAVIOR AS RELATED TO MEANING AND TO THOUGHT

In earlier chapters, the fact has often been emphasized that a large part of our behavior is under the control of instinctive tendencies and of habits: definite situations give rise to responses that are more or less mechanical in their nature. It has also been pointed out that new situations frequently arise to which neither the established habits nor the native tendencies guarantee a satisfactory response. The old modes of conduct are no longer adequate, and something that differs both from instinct and from habit must supervene if the difficulty is to be solved.

The thought crisis. It is under these conditions of inadequate adjustment that a " thought crisis " arises. If the situation is so unusual that we cannot solve it by instinct or habit — if our customary behavior is blocked, and no new modes that are practicable present themselves — we may be seized and overcome by *emotion.* (See pp. 69 ff.) If, however, the new situation presents a suggestion of possible solution — if it seems that a satisfactory solution is possible — we begin to *think* clearly and definitely; we " reason out " how to accomplish the end that we seek. While under the sway of emotion our thoughts are confused, our feelings intense, and our attention fluctuating;

under the guidance of reason our ideas become clear, our feelings are subdued, and our attention is fixed successively upon the elements in the situation that apparently lead to the goal of our endeavor.

The incidents of the sailing trip described in Chapter I serve to illustrate the development of the thought crises under the stress of a new and unexpected situation. The sailing of the boat was largely a matter of habit until the ledge of rocks came into view. Then a difficulty was presented demanding intelligent action. But an emotion came first. When it seemed as though the boat must dash upon the reef, a wave of fear swept over me. I did not know how to act. In vain my mind ran over one aspect of the situation and then another. I could not think clearly; I felt helpless; and my attention, undirected by reason, focused one point and then another in a confused and haphazard fashion. But this confusion was only momentary. Out of it the *idea* of "heading the boat up" quickly emerged. Instantly my thoughts became clear; my intense feelings subsided; I had a definite purpose that controlled both my thinking and my doing. But this in turn gave place to another wave of emotion when I found that, after all, I could not sail around the reef by heading into the wind. Again the intense feeling of helplessness overcame me; again the ideas became confused, and attention flitted from point to point. But once more, a clear idea of a means of escape dispelled the confusion. Again the flow of thought clarified, and the despair that had seized me faded away. I worked rapidly, but steadily and persistently. There was nothing haphazard, nothing meaningless, in either thought or deed. Out went the sail until it hung flapping and limp in the wind. The boat "lost head," was caught by the wind and the tide, and thus drifted out of danger. The difficulty had been solved, not by falling back upon habit or instinct, not by a lucky chance, but by thinking out the problem.

Thinking usually involves a difficulty. Thinking seldom arises except under the stress of some difficulty — unless a problem is to be solved, or a new set

of conditions is to be dealt with. When one is compelled to think, the ideas that come into consciousness assemble themselves around the problem that one is facing. These ideas "flow on," toward the end that one is seeking. In other words, the sequences of perceptions, images, and ideas are, in clear thinking, always going somewhere; they are not moving in a haphazard manner as in states of emotion, idle fancy, or daydreaming.

Thinking involves past experience revived as "meaning." Another condition of thinking is found in the fact that it always goes beyond what is immediately present in sensation. A succession of pure sensations (or their reproduction in uncontrolled images) would not constitute a thought process. Ideas and meanings must be employed; sensations must be interpreted in the light of past experience; and more than this, meanings must be related to the problem in hand. Conscious processes that have a meaning unrelated to the problem are likewise incapable of playing a useful part in one's thinking.

This important fact may be illustrated as follows: When I heard the band playing on the occasion of the circus parade; when I caught a glimpse of the procession passing my window; when I saw the crowd assemble on the street, and my son rush out to join it; these sights and sounds were more than pure sensations. They possessed a significance, a meaning, and yet I rigorously rejected them, thrust them out of my consciousness, because their meaning did not fit in with the problem that I was then facing. I turned to my desk and once more took up the task that I had set before me. As I became more and more deeply engrossed in my work, the sensory impressions coming in from the outside world became correspondingly dim. I vaguely knew that I was sitting at my desk, that

I had a pen in my hand, and that a sheet of paper lay before me; but these sensory data did not enter into my thoughts, not because their meaning was unrelated to my problem, but rather because to me at that time they were devoid of meaning. Indeed, they were as near to what we have termed *pure* sensations as it is possible to approximate in states of normal consciousness.

When we say that certain conscious processes are excluded from the onflowing current of thought, then we signify either that they have no meaning to us for the time being (that they are pure sensations, or pure images); or that their meaning in no way fits in with the meaning of the processes that are then occupying our minds (that their meaning has no relation to our problem). Usually these two aspects of meaning are closely related, since we ordinarily give a meaning to a sensory experience insofar as we attend to it, and we usually attend to those sensations that do have significance for us in terms of our present problem.

Primary passive attention, it is true, often attaches itself to objects that have no significance for our thinking — no relation to our present problem. We *must* let the flash of lightning into our consciousness; we *must* give it a meaning (that is, recognize it), although it may have nothing whatsoever to do with the general trend of our thought. However, since it has no place in the assembly of conscious processes, it quickly loses its meaning and is lost to consciousness. On the other hand, those experiences that do have a place rapidly grow in meaning as they are attended to and brought into the clear light of consciousness.

Meanings vary with the problem in hand. Meaning, while it appears in its most marked form in the reasoning processes, is never absent from a consciousness that possesses any degree of complexity or significance. The red flag that I see is more than a *mere* red object.

It means to me danger when I see it displayed at the railroad crossing. Later I see a similar flag over a shop door, and now it means to me that an auction is in progress. Again, I see a red flag carried by a band of men and women who are parading through the streets, and this time the flag means to me Communism. In any case, the state of consciousness goes beyond the immediate and direct sensations informing me of the object and extends to what the object signifies in terms of my behavior toward it.

All objects of my experience, then, whether present to the senses, or merely imagined, signify something beyond the objects themselves. The table that is before me means an object to write on, because it stands in my study, and I am accustomed to sit at it when I am writing. The table in the dining room means an object to eat from, because this is its customary use. The general idea " table " may be said to include these and all other meanings that objects of this class have for me.

Meaning is fundamentally determined by use or behavior. This again suggests the important principle frequently referred to in preceding chapters; namely, that " meaning " fundamentally resides in the use of the object that is given a meaning. This fact is strikingly illustrated in the definitions of little children. A horse is " to ride "; candy is " to eat "; a knife is " to cut with "; etc. Only in later childhood are objects defined in terms of their *qualities* (" a horse is a large, four-legged animal;" " candy is a sweet substance "), and qualities in their last analysis stand for or represent the possibilities of behavior in reference

to the object. If nothing could be done with it — if it had no use, no reference to our lives and our needs — it would have no meaning (p. 147).

This is as we should expect it to be, from the principle that we have held to in our previous discussions — namely, that consciousness is useful because it helps in directing our behavior. The mere sensory experience acquires significance only through the acts that accompany it. *Identity of meaning consists in an identity of behavior, and a difference in meaning consists in a difference of behavior.* Two objects mean the same thing when the behavior that they call up is identical; different things, when the accompanying behavior is different. Thus it happens that a single object may mean different things to different persons, simply because they behave toward it differently; further, this same object may mean different things to the same person at different times, because his behavior on these different occasions may vary.

The fact that meaning at first attaches itself to the behavior called forth by an object that possesses this meaning, and later to some quality that resides in the object, may be illustrated by the following example:

When the boy sees a pond of ice, or calls it up in imagination, he at once "thinks of it" as a surface to be skated on or slid over. This is its meaning to him. An adult may have in mind, in seeing the ice or in imagining it, not the activity of skating, but the *quality of smoothness.* Here the meaning is represented by a quality rather than by a definite act. But if the significance of smoothness is analyzed, it will be found to reside in some such activity as skating or sliding which is made possible by smoothness.

Why meanings attach to qualities as well as to acts. Accurate thinking requires that meanings should attach

to qualities as well as to acts because (1) these qualities are *less cumbersome* to deal with in our thinking; (2) they are *more definite;* (3) they are *more easily represented in consciousness* than are the activities that they symbolize; and (4) they may include or " cover " *a large number of possible activities*, one or more of which may be chosen to fit the situation in hand. Our thinking would move on in a most uncertain and laborious way if we were obliged to call to mind in any detail the various kinds of behavior that center around an object of consciousness. As thought becomes more and more refined and exact, the qualities that represent behavior and thus give meaning to objects become less and less rich in movement-detail, and farther removed from concrete experience.

The development of symbols that stand for qualities. But the process of condensation goes even farther than this. As acquaintance with the world of objects continues, even the qualities become less and less explicit in thinking, and a mere word or other " symbol " comes to stand for them, and in turn for the types of behavior that they represent. A pond of ice is no longer definitely adjusted to with certain movements typical of skating or sliding. It may no longer even be visualized or imagined in visual terms when we think of it. The very word " ice " carries with it all the essential meanings. And yet if we analyzed the meaning that this word has for us, we should find that it would lead first to definite images of the appearance of the ice, for example, to images of a smooth surface, and ultimately to the movements which the quality of smoothness implies.

The value of thinking in symbols. In order to think accurately and rapidly, it is necessary to think in symbols — to think in abstract rather than in concrete terms. *But if this thinking is to have final value, we must always be able to translate these symbols into the behavior for which they stand.*

A helpful analogy may be drawn between the use of symbols and the use of money in the commercial world. Symbols — words, diagrams, formulæ — are the common denominators of experience, just as coins are the common denominators of value in the business world. Money stands for values, represents values; but in itself it need have no value. It must, however, always be capable of being turned into objects or processes that possess intrinsic worth — food, clothing, building materials, labor. Likewise the symbol may be quite unlike the object for which it stands: the word "horse" when written or printed does not look like a horse; when spoken, the sound is not like any sound that the horse makes; there is here no sensory resemblance between the symbol and the object symbolized. We simply understand that this is to *mean* what the object "horse" means; but to use the word effectively in our thinking or in communicating with others, we must be capable of translating the word into its basic meaning.

Conceptual and perceptual attitudes. When I recognize an object — for example, a pencil — and know what to do with it, my knowledge of the pencil is based upon my experience either with this particular pencil, or with other pencils. I know how to behave in regard to the particular object, for the simple reason that I have previously behaved toward the same object or toward similar objects in a certain way. A *conceptual* attitude implies that I behave toward various objects of a class in a similar way; while a *perceptual* attitude implies that I behave toward a definite, particular object in a typical manner.

There is in my study a particular chair that has the trick of falling over if I lean too heavily against the back. I have learned this fact through several unpleasant experiences, and now I conduct myself in reference to this fact when I am seated in the chair. This particular chair means this particular form of behavior with reference to it, and my attitude toward it is a perceptual attitude, for I behave toward no other chair in just the same way. Toward the majority of chairs, I have the conceptual attitude; that is, there are a number of behavior-patterns that are common to all chairs. I know how to use the various chairs, not because I know anything about these chairs in particular, but rather because I have a general idea of the things that can be done with any or all chairs.

The economy of conceptual behavior: the judgment. It is evident that the conceptual type of behavior is more economical than the perceptual type, since the former extends its meanings over a much wider field of experience than does the latter. It is therefore highly important that rational thought make use of the conceptual mode of thinking, as, indeed, it does to a very large extent.

Conceptual thinking expresses itself most clearly in what is termed the *judgment*. The judgment identifies the particular object of thought with the type to which it belongs, and *this identification gives us the cue to the appropriate behavior*. We say, for example, that the round, yellow object lying on the shelf is an orange. This classifies the particular object with reference to similar objects that we have met in our past experience. We consequently know what to do with this item of present experience. Our behavior is suggested by the class into which the object is placed. As a matter of fact, of course, one does not ordinarily make such judgments explicit in the way indicated. The object is

almost immediately interpreted or recognized as an orange. In case of uncertainty, however, the judgment may be delayed, and a careful scrutiny may be required to discover just what it is — in other words to identify the general class to which it belongs.

When a physician is confronted with a case of illness, he tries to find the class of illnesses which the particular case represents. He takes the patient's temperature, finds the pulse rate, and often makes elaborate tests before he ventures a diagnosis. When the diagnosis is made, it is an example of what we have termed a judgment. The particular case has been identified under a certain class of diseases or disorders. " This is diphtheria " or " This is acute indigestion " or " This is smallpox." Diphtheria means one kind of treatment — one kind of behavior; indigestion means another type; smallpox, still another.

Both induction and deduction characterize thinking. We make the judgment, " All honest men tell the truth "; and we follow this statement by a second, " John Smith is an honest man "; this brings us to the conclusion, " John Smith tells the truth." We call this process *deduction*, because we start from some general principle and arrive at a particular conclusion.

Reasoning often takes the opposite direction, however. We observe that, day after day, the sun rises in the east. From these particulars we arrive at the conclusion that the sun always rises in the east. This method of procedure from the particular to the general is termed *induction*.

Ordinarily both induction and deduction are employed in solving a problem by reasoning. It is only

on exceptional occasions that either method is used alone. From observing a number of facts, we conclude that a certain general principle applies; then we seek, from the suggestions given by this general principle, to find more facts that will confirm it.

The complete act of thought. The complete act of thought includes both reasoning by induction and reasoning by deduction. Every complete act includes several so-called "steps" in thinking, although it is true that much effective thinking is done in which it is impossible to make use of each step, nor is it to be understood that one step always follows the other in unalterable sequence. The steps indicate the various procedures, but these usually fuse and overlap to a considerable extent, and, in many instances, one or more may be actually or apparently omitted.

Step 1: First of all, there must be a difficulty to be met, a problem to be solved, a question to be answered. The first step, then, is to be clear as to what it is we are trying to do.

Step 2: The second step is to analyze the problem, to find out some things about it which will lead to one or more suggested solutions or answers. Ordinarily we are searching here for a general meaning which will suggest a way out of the difficulty.

Step 3: These suggested solutions or hypotheses which we get by interpreting the results of the analysis constitute the third step. Perhaps several of these hypotheses suggest themselves as soon as the difficulty is felt. If so, it appears that the step of analysis has been omitted. This simply means that similar difficulties have been met and analyzed during previous experience,

and have led to the hypotheses which now present themselves. This procedure of arriving at suggested solutions by means of interpreting the facts brought out by the analysis illustrates induction.

Step 4: The fourth step illustrates deduction and arrives at the same kind of results as Step 2. Keeping in mind the solution or hypothesis which " looks good " to us we say to ourselves, " If this solution is correct then certain other facts must be true in the situation." It is a further analysis of the problem, an elaboration of the implications of the hypothesis.

Step 5: The fifth step is similar to the third in that it is an inductive procedure. It will be recalled that Step 4 is a continuation of the analysis begun in Step 2. In Step 5 the facts brought out by this further analysis result in accepting or rejecting the solution which " looked good " in Step 3. If all the facts or evidence in the situation do not uphold the solution, we must seek a better one, in which case we find ourselves back at Step 3. If the solution is substantiated by all the factors which have been analyzed out in Steps 2 and 4, then we are ready for the last step.

Step 6: This step, that of verification, may or may not be present. It is not by any means possible always to prove that our decisions are correct. Where such checking is possible, it is desirable.

Educational corollaries. In the light of the preceding discussion, certain suggestions with regard to the place of reasoning in the process of education may be indicated : —

(1) *The pupil should be confronted with actual problems.* Since thinking comes most frequently when a

problem is presented or when a situation is faced or when a crisis in our behavior arises, it follows that, to stimulate thought, we should confront the pupil with actual problems. Especially significant are those problems which the pupil recognizes as such. Facts and principles that help to solve these " vital " problems take on a significance and meaning which they would otherwise lack. It is improbable that all of the knowledge that must be imparted can be presented in answer to definite problems arising in the pupil's own life; but the teacher will find that effort spent in searching out possible points of contact between the lives of the pupils and the materials of instruction will pay large dividends in interest, enthusiasm, effective learning, and accurate retention. Herein lies the chief value of the " project method."

This process is sometimes referred to as "motivating" the work of instruction, and is similar to the process of motivating the habit-building disciplines (p. 131). Very frequently, however, the term is used in too narrow a significance. While in vitalizing instruction it is well to employ the pupils' interest in games, in out-of-door activities such as garden-making and school-excursions, in the industrial arts, and in dramatics, it should also be remembered that the older type of school work provided many opportunities for real and engrossing problem-interests. Eighth-grade children may, for example, be curious to know the causes that led to the Civil War. This interest forms a real and effective problem or "situation" from which a valuable exercise in reasoning may result. In the light of this interest, a list of facts may be presented and the pupils asked to select those that seem to be significant as causes of the War. Animated discussions will follow as to why certain events were significant or insignificant. Under the guidance of the teacher, the relations between cause and effect will be emphasized, and the significant causes may be formulated in a summary or conclusion.

In this connection, it should be said that presenting facts with reference to a problem is one way of *organizing* these facts. Teaching which continually emphasizes this procedure will inevitably impress the pupil with the value of knowledge in solving problems, and with the importance of organizing knowledge with reference to unifying purposes.

The assignment of lessons is particularly important from this point of view. In a skillful assignment, the material to be studied is definitely and explicitly related to some problem or purpose. Generally the new material leads on from a point that the pupils have already reached, and, in many cases, problems have already arisen in their minds which can be solved only by the material of the new lesson. The expert teacher is always very careful in making assignments to make these problems explicit, and to show in what way the new lesson will help to solve them.

(2) *The development of meanings is fundamental to effective reasoning: the importance of actual adjustments.* Since rational thought involves the employment of meanings, it is essential that the pupil be well supplied with a stock of meanings if he is to think effectively. In other words, he must have his "resources" — his "stock in trade" — as well as a problem to solve.

Since, in the last analysis, meaning is reducible to behavior or conduct — since meanings are "cues to conduct" — it follows that the factor of *doing*, of making actual adjustments to actual situations, is an important element in teaching the pupil how to think. The words that form the vehicles of meanings must be capable of being worked back into actual adjustment; otherwise their employment in education is but the most barren type of formalism. (See p. 147.)

It is at this point that the emphasis that has been placed in recent years upon actual motor responses finds a large part of its justification. These activities are important, not only because they "fit for life," but also because they give significance and meaning to the more abstract processes that the school properly emphasizes. All of the "laboratory" sciences, such as physics, chemistry, botany, zoölogy, physiography, and physiology, make a prominent use of this factor. In the study of literature, the temperate employment of the dramatic tendency has been found to add a most valuable element in understanding and appreciation.

But it should not be supposed that effective response need always involve actual movements of the body, actual motor adjustments to external situations. The factor of *doing* is sometimes adequately represented by *imagined* adjustments. Even the older formal education, with its exclusive emphasis upon words, was often effective because, to many of the pupils, the words suggested motor responses which were carried out imaginatively. The problem of education in giving the pupil a usable capital of meanings is to make certain that words will operate in this way, and that the pupil will live, if not actually, at least in imagination, the events and conditions which the words describe. In short, successful education should enable the pupil to think out his problems when necessary without the employment of actual objective situations. But, in order to attain this end, it must emphasize the objective situations in its earlier stages, and proceed very gradually from the concrete to the abstract.

(3) *General meanings or concepts are the most important resources for thinking.* The concept, as has been said (p. 210), stands for " type-reactions " which include a large number of possible responses. The concept, therefore, becomes the " cue " to a large number of acts and covers a wide range of behavior. It is obviously of the greatest importance from the standpoint of mental economy to reduce experience to the form of general concepts and principles, and thus to

provide the resources of thinking. The conceptual attitude is the essential attitude of intelligent human beings.

One of the oldest and most important precepts of teaching may be called a " Rule for Concept-building." It is usually stated as follows: " Proceed from the concrete to the abstract; from the particular to the general; from cases to principles." Thus in developing the meaning of any important term (such as " noun," " adjective," " verb," " adverb," and " preposition," in grammar; " commerce," " watershed," " river basin," " coastal plain," " prevailing winds," " trade routes," in geography; " digestion," " respiration," " locomotion," in physiology; " bacteria," " contagion," " infection," " asepsis," in hygiene; " representative government," " electoral college," " democracy," " bill," " law," " act," " tariff," in civics) the teacher first brings the pupils face to face with concrete cases illustrating these terms just as clearly as possible, presenting them, if feasible, in connection with definite problems. After the pupils have become familiar with the concrete cases, the definition of the term may be formulated and learned. In some cases, the definition may be given first and then illustrated by a wealth of concrete details. The order of procedure will depend upon circumstances, and no dogmatic rule can be laid down for governing this phase of the teaching; *the illustration of the definition by typical cases within the experience or understanding of the pupil is the important thing*, and for this the teacher can afford to spend a great deal of careful planning.

In general, illustrations should be selected upon the basis of the *clearness* with which they body forth the principle or the definition that the teacher wishes to impart. Illustrations should also emphasize the *typical* or *relevant* elements in the meaning that is to be taught. Many illustrations miscarry because they suggest irrelevant factors — lead the pupil off on the wrong track and consequently obscure rather than illuminate the point at issue. Again, the point may be so enmeshed in details that the pupil "cannot see the woods for the trees."

Illustrations, wherever possible, should be objective. The school museum is important in this connection, especially in providing specimens of various commodities of commerce in different stages of manufacture. In many cases, definitions can be richly illustrated by school excursions to near-by points of interest. A visit to the freight station, for example, may be made to illustrate very effectively the meaning of the word "commerce."

Objective illustration, as has been said in another connection, may be profitably supplemented by the use of pictures, diagrams, and charts; and there are, of course, many phases of instruction that can be illustrated only through these means. The stereoscope, the projection lantern, and the reflectoscope offer opportunities for helping the imagination to construct and react to situations that the pupil could never have an opportunity actually to face. The possibilities of the moving picture in this connection are now beginning to be realized.

In the use of pictures, as has already been pointed out (p. 38), it is essential to keep clear in mind the purpose of the work. As an educative agency, the picture must be something more than merely entertaining. It must illustrate a definition or a general principle, and the teacher must see to it that the pupils pass from the perceptual to the conceptual attitude. (See p. 210.)

(4) *The tentative hypothesis: its value and its dangers.* It has been pointed out that inductive reasoning works from particulars toward a general conclusion which will cover the particulars studied and which is generalized to cover other similar particulars. It is, however,

impossible in most cases to test the generalization with reference to all of the particulars which it is supposed to cover. When a generalization is suggested by a study of a few concrete cases, it is known as a " tentative hypothesis," and not until it is found valid when applied to all observed or observable cases, does it become a " law."

It is fundamentally important in education to emphasize the distinction between tentative hypotheses and laws. The hypothesis is, of course, a necessary and valuable step in reasoning. It is the " clew " upon which further reasoning proceeds. The danger that confronts the reasoner is that he will take the hypothesis as a permanent principle, and then shut his mind to the facts that it fails to fit.

There are two points at which the danger of confusing an hypothesis with a law needs to be guarded against with especial zeal. One is represented by the investigations that are made to establish some belief in which the investigator is deeply and emotionally interested. In a case of this sort, he is likely to find what he is looking for, and to be blind to anything on the other side. *He may be quite unconscious that his bias is thus defeating the purposes of his investigation;* hence it is essential that he should consciously "lean" a little to the other side, in order to counteract the deep-lying attitude that unconsciously tends toward the desired result.

In the second place, it is always well to place the burden of evidence upon any hypothesis that tends to open the lines of least resistance, intellectually or morally. It is sometimes said, for example, that a "strict" bringing-up defeats its own purposes, leading to an evil life rather than to a good life. The example of clergymen's sons is often cited in this connection. If a boy who has been brought up in the family of a clergyman "goes wrong," this single fact is likely to be extended or generalized to cover all such cases. As a matter of fact, there is no evidence to show that the rule is general while

very definite evidence points to quite the opposite conclusion — namely, that clergymen's children are more likely to turn out well than the children of any other occupational group, and that their upbringing is an important factor in their success. The same principle may well apply to matters of school government; a proposed policy that is based upon "soft" and "easy" methods should certainly be looked upon as a tentative hypothesis; not necessarily to be rejected, for it may involve a helpful reform; but rather to be tested carefully under controlled conditions and within a restricted area until its influence can be accurately determined.

The problem of training reasoning. The problem of developing reasoning power, like that of the transfer of specific habits (p. 195), has been disputed very vigorously among educators during the last two decades. The following hypotheses may form tentative suggestions for practice pending a final decision:

(1) The pupil may be profitably instructed in *methods* of reasoning. He may be taught by numerous examples the necessity of careful, extended, and unprejudiced observation, of careful comparison and abstraction, and of cautious generalization. He may be shown over and over again the danger of drawing hasty conclusions, of leaving out of consideration factors that should influence his judgment, and of depending without question upon the hearsay evidence of others. He may be taught the value of approaching his problems in the rational attitude, of analyzing them into their elements, and of searching in his own experience and in the records of race experience for some practicable solution. If he is led over and over again to take these steps, to go through with the rational processes himself; and if, moreover, he is thoroughly impressed with their value, with the fact that they "get results";

there is every reason to believe that his mind will be "trained" somewhat as the older advocates of the doctrine of formal discipline contended. He will gradually formulate an ideal of the procedure which reasoning involves.

(2) In this connection, also, it is possible to give the pupil a command of what may be called ideal patterns of reasoning. He may learn to arrange his propositions in a logical order so that the connection of one with another will be clearly revealed. In other words, he may be taught, through innumerable illustrations and exercises, to *organize* in a logical fashion his facts, principles, hypotheses, conclusions, and proofs.

The courses in geometry are sometimes effective in attaining this result. The pupil sees the advantage of arranging arguments in a certain, definite order, passing gradually from step to step until the conclusion is reached or the principle established. Well-organized work in English grammar and especially in the grammar of the more highly inflected languages, such as Latin or German, may contribute toward the same end — provided that the teacher is skillful enough to make clear to his pupils the advantage of close and consistent organization.

(3) The pupil may come to appreciate the worth of the reasoning attitude as contrasted with the emotional attitude or the attitude of trial and error. He may be shown through the study of geography, physics, chemistry, biology, and hygiene, and through the study of industrial history, that careful, serious, persistent, and patient thinking has made possible the great triumphs of science, and the comforts and amenities of

life that have resulted from these achievements. The lives of men like Watt, Stephenson, Fulton, Morse, Pasteur, Bell, and the Wrights are full of inspiration to the normal adolescent, and these lives illustrate at every point the triumph of reason over the obstacles that nature has placed in the way of human progress.

(4) Whatever may be the case with regard to the methods of reasoning, there can be no doubt that reasoning capacity depends as much upon resources as upon method, and here education has a clear and undisputed field. It can and must supply the pupil with the meanings, concepts, facts, and principles that have been garnered and winnowed through the long course of human experience, and which constitute the materials with which reasoning works. In other words, education can and must pass on to each generation as much of the *accurate knowledge* that has been accumulated as the learner can healthfully assimilate. In this way, possibilities of reasoning are opened, and if the teacher does his best to demonstrate the best methods of using this knowledge and to develop *an appreciation of the value of using knowledge in order to reason accurately*, he may be fairly confident that something has been done to " train the reasoning powers."

Summary. Thinking takes place as a rule only when we face a difficulty. Meanings are essential to thinking or reasoning. Facts state the relations that have been found to exist among meanings. We cannot think without facts. The more facts, the more comprehensive the meanings, and the more numerous, dependable, and well-organized the facts, the more efficient our reasoning is likely to be. The complete act of

thought includes both induction and deduction. When we go from particular facts to generalizations, from cases to principles, the reasoning is inductive; when we begin with a generalization or a principle and find particular facts which are upheld by it, the reasoning is deductive. Pupils should be stimulated to think by being confronted with actual problems. They should be made acquainted with patterns of thinking (or of problem solving). If practice in reasoning in school gives them a command of and a respect for these patterns of thinking, they will be better able to solve the problems that will come to them in life outside the school.

Definitions and Explanations of Terms Used

Thinking. A complex mental process which may take place when innate tendencies and habitual responses are inadequate. In the process of thought past experience is consciously and deliberately brought to bear upon a present situation. The process of thought differs from an emotion in that it involves a steady onflow of ideas and perceptions, and clearness of ideas rather than affective intensity.

Meaning. The essential form in which past experience operates in the process of thinking. As was pointed out in the chapter on Perception, the "meaning" of a group of sensory impressions is determined by the adjustments or responses that have been made to these impressions in the course of experience. The *qualities* represented by the sensory ingredients in a perception or an idea, however, gradually come to stand for or represent these adjustments or responses;

and the qualities may in turn be replaced by *symbols* which bear no sensory resemblance whatsoever to the original perceptions, but to which the appropriate meanings may be attached. Thus meaning is, at basis, a " cue " which suggests a certain adjustment or a " bundle of cues " which suggest many possibilities of adjustment.

Concepts. Meanings of the latter type are often termed *concepts.* A concept is a *general* meaning; that is, suggests types of conduct that hold good for a number of different objects or situations.

Judgment. The simplest process of thought, consisting in identifying a perception or an idea under a more general meaning, and thus suggesting the type of conduct that is appropriate.

Judgment, like all thought processes, arises usually in a crisis which compels the individual to hesitate before acting; in this period of hesitation, the situation is analyzed, and the analysis suggests the concept with which the situation is to be identified or otherwise related.

Reasoning. A more complicated process of thinking which involves passing from one judgment to another, and finally reaching a *conclusion.*

Inductive reasoning. That form of reasoning which proceeds from particular judgments to one that is more general.

Deductive reasoning. That form which proceeds from a general judgment to a statement of one or more of the particular judgments which it covers.

Tentative hypothesis. A judgment based upon an inspection of a relatively few particulars, and only

provisionally thought of as covering all particulars of the same class.

Law. A judgment that covers all cases of the same type.

QUESTIONS AND EXERCISES

1. What are necessary conditions of thinking? What effect has emotion on reasoning?

2. What are the purposes of reasoning? List as many causes as you can of failure of people to think.

3. Illustrate what is meant by thinking in symbols. What is the advantage of symbols in thinking?

4. Distinguish between percept and concept. Illustrate each. Distinguish between induction and deduction. Illustrate each.

5. Explain the following, "The essence of critical thinking is suspended judgment." Distinguish by definition and illustration between an hypothesis and a law.

6. What are the steps in a complete act of thought? Which steps may be omitted? How can you explain the omissions? Which steps can never be omitted? Which steps are most likely to fuse? Illustrate how the fusion may occur.

7. Indicate at least four suggestions which the school may well follow in training pupils to reason.

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CHAPTER XIII

MEASUREMENT AND BEHAVIOR

One of the most important developments in modern psychology has been the application of objective measurements to mental traits and functions. For a long time, men have held and expressed *opinions* with regard to various aspects of human behavior, but these opinions have been largely *subjective*, that is, they have been based upon the unconfirmed observations of the individuals forming them. Psychology as a science has depended very largely upon a particular type of observation: the observation of one's own conscious processes. Such observation is called *introspection* — literally "looking within" or self-examination. Unlike the facts with which the objective sciences deal — such sciences as physics, chemistry, and biology — the facts for which the psychologist has claimed validity could not often be objectively demonstrated or confirmed. Other observers might find similar facts through their own introspection — and they might not. In the latter case no one could tell which observer was right.

Examples of psychological measurement. Introspection still has and probably always will have a place in psychological investigation, but it is now being supplemented and in some instances supplanted by processes of measurement somewhat akin to those used in the objective sciences. For example, we no

longer merely " guess " that a person is mentally defective: we make a more nearly accurate estimate of his mentality by noting the way in which he responds to certain tests. These tests have been given to thousands of people of all ages and classes, and the results carefully analyzed and classified. In this way, *norms* or standards have been determined for each age-group, and the degree in which any person deviates from these norms can be determined by giving him or her the tests and noting the results.

Again, it is no longer necessary to guess as to whether a pupil has made in the various school subjects the progress that is normal for pupils of his age and grade. For each subject — arithmetic, reading, spelling, handwriting, geography, history, and the like — tests have been standardized by giving them to large numbers of pupils of all ages and grades. By giving these achievement tests to a pupil one may readily determine whether this pupil is above or below or just in line with the average of his age or of his grade.

Learning curves. Before mental and achievement tests were devised and standardized, psychologists had applied objective measurements to some of the learning processes, especially those that are involved in the mastery of skills. One of the earliest investigations in this field aimed to determine the rate of growth in mastering the art of telegraphy. For example, the number of words that the learner was able to tap out on the telegraph key in a given unit of time was recorded; then after equal intervals of practice the number of words that could be tapped in the same unit of time was determined. As the speed increased,

the progress of the learning was plotted as a curve. As different types of learning were studied, curves of learning were multiplied in number, and a comparison of them revealed a number of interesting facts.

Among these facts, was the discovery that learning curves tend to assume one or another of two rather definite patterns. If the skill to be acquired is catching a ball, learning to typewrite, learning to add one-place numbers, or the like, the curve of learning will rise rapidly at first and then more slowly, gradually flattening out into a permanent plateau as the limits of one's ability are approached. Figure 8 shows the general form of the curve which pictures this type of learning. The appearance of the curve explains the name given to the general pattern — the *convex* learning curve.

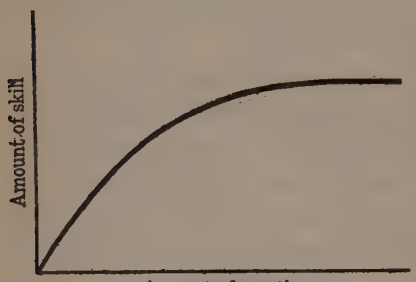

Fig. 8. A convex learning curve.

If the skill to be acquired is the ability to translate the words of a foreign language, progress at first will be slow, but as one acquires a mastery of the vocabulary, the learning will be accelerated. Figure 9 shows the *concave* learning curve which commonly pictures learning of this type.

Plateaus in learning curves. It often happens that there are intermediate periods during which no improvement is measurable, although practice is continued. Such a period of no apparent improvement is repre-

sented by a horizontal line in the curve, and is called a plateau. Periods of growth thus commonly alternate with stationary periods. If the rate of learning illustrated by the smooth curve in Figure 10 were measured more often it would probably show a number of plateaus as indicated by the dotted line.

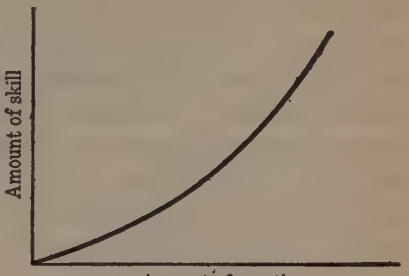

Fig. 9. A concave learning curve.

The significance of plateaus in habit formation. The periods when growth is slow and halting or, indeed, nonexistent are critical for the learner, since he is likely at such times to become confused and discouraged, and to give up entirely the discipline that is essential to further growth.

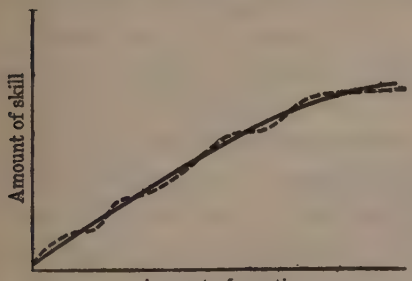

Fig. 10. A learning curve indicating plateaus.

In practically all subjects involving habit-formation, the initial stages are interesting first on account of their novelty, and secondly on account of the relative ease with which some skill — trifling in amount and yet gratifying to the learner — may be attained. There comes a period, however, when difficulties increase, and progress is greatly retarded. The pupil who has found it rather easy to work out manual

training projects involving only the simplest operations comes to a project which requires the making of nicely fitting joints. He must now climb to a higher plane of skill, and the difficulty of making this advance stands out sharp and clear against the relative ease of his early conquests. The student of telegraphy may have little trouble in sending ten or fifteen words a minute, but to increase his speed to the point where he can send twenty or thirty seems to take much more than double the time and effort required for the simpler achievement. The young teacher may quickly reach the point where the supervisor will rate instruction and discipline as " B," but years of strenuous and persistent work may be necessary before the rating month after month is recorded as " A +."

The treatment of habit on the plateau stage. It is a matter of dispute among psychologists whether these plateaus of growth are really essential in the practice curve, or whether they may not be avoided if proper precautions are taken. In other words, if the teacher did his work perfectly, would not these halting places in the progress of pupils disappear, and would not the curve of growth be represented by a steady upward sweep, with no " flattened " places, and no periods of actual relapse?

This question cannot be answered at the present time, but it should be insisted that the teacher may take certain steps to render these plateaus less disastrous than they would be otherwise. In the first place, the pupil may be encouraged to persevere, even if he has reached a plateau of growth. Or, if the conditions warrant such a course, he may be encouraged to drop

his task for a while and to come back to it later, for lack of progress may be due to fatigue, and a rest will restore the capacity for growth to its original efficiency. Again, the teacher may see to it that the learning proceeds by carefully graded steps; that the learner does not attempt a new set of habits or a new type of skill until he is ready for it.

Finally, the teacher may see to it that one of the chief factors in success has a chance to operate — namely, self-confidence in one's ability to do the work, to solve the problem, to master the skill. There is some danger here that the learner may come to depend too much upon praise and adulation, and to become discouraged if praise is not forthcoming when he thinks that it should be. But between excessive praise which would lead to this result and the absence of all commendation, which deadens everyone save the genius, there is a happy medium which the intelligent teacher will quickly recognize.

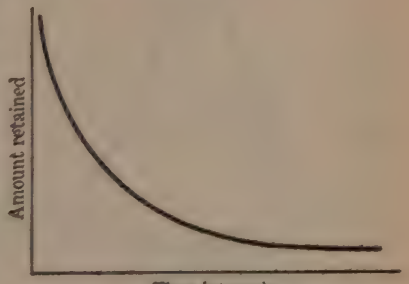

Fig. 11. The curve of forgetting.

The curve of forgetting. The rate at which memorized material is forgotten has been measured and is illustrated graphically by the curve of forgetting. Experimentation has proved that the rate of forgetting decreases as the time interval after learning increases. The rate of forgetting is estimated by measuring the amount of material remembered, allowing an equal

interval of time to elapse between each measurement. Figure 11 shows the typical curve of forgetting.

Curves of distribution. *The normal curve.* If a sufficiently large number of cases are included, any trait that is measured will be found to be so distributed as to show a *normal curve of distribution* or a *normal frequency surface.* Although all individuals vary in every measurable trait, the great majority cluster around an average or middle amount, and about as many persons are "long" in a trait as are "short" in the same trait.

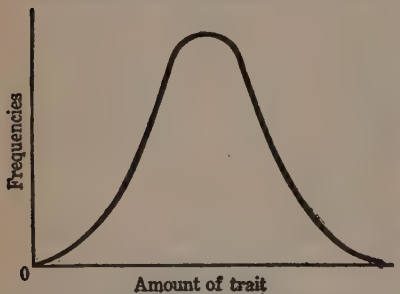

Fig. 12. The normal curve of distribution.

When abilities of groups are measured, the distribution does not coincide exactly with that illustrated by the normal curve of distribution which is a theoretical curve, but if the data are secured from a large, unselected group, and if the measurements are carefully made, the differences between the actual curve and the theoretical curve will be insignificant. Figure 12 shows a normal curve of distribution.

Skewed distributions. Suppose a teacher gives to 10% of a class a final grade of 100%; to 20% of the class, 95%; to 30% of the class, 90%; to 20% of the class, 80%; to 10% of the class, 70%; to 6% of the class, 65%; to 3% of the class, 60%; and to the remaining 1% of the class, 50%. If these grades are plotted on a graph, the distribution curve will be "skewed" to the

left. The reason for the " skewness " is that a large per cent of the group received grades above 75%, which is the average or middle grade. Figure 13 shows such distribution. A similar curve would result if the scores of a test which was too easy for the group to which it was given were plotted.

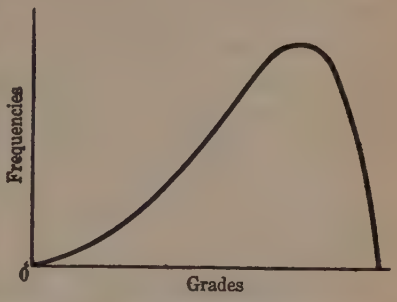

Fig. 13. A distribution curve indicating a skew to the left.

Suppose another teacher who is a severe marker gives 1% of the class 100%; to 5% of the class, 90%; to 14% of the class, 80%; to 20% of the class, 70%; to 40% of the class, 60%; to 15% of the class, 50%; and to the remaining 5% of the class, 45%. Such a distribution when plotted will show a curve skewed to the right. Figure 14 illustrates this type of skewness. The same kind of curve would result from the plotted scores of a test which was too difficult for the group to which it was given.

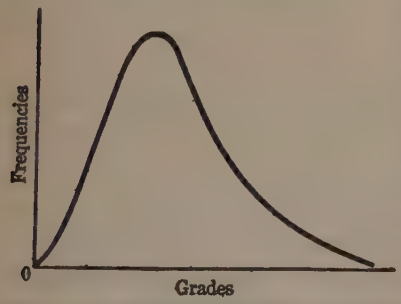

Fig. 14. A distribution indicating a skew to the right.

The significance of distribution curves. Of what use is a distribution curve? Many facts can be learned from it if one knows how to read it. For example,

suppose that a distribution curve is made to show the scores of a class on a standardized test in arithmetic. The *range* of the scores can be readily computed by noting where on the base line the curve begins and ends. This shows how many points apart the poorest and the best pupils are. If the range or " spread " is wide, the class is heterogeneous in arithmetical abilities; if the range is narrow, the group is inclined to be homogeneous with respect to these abilities. Effective procedures in teaching are likely to vary accordingly as the group is heterogeneous or homogeneous.

The *central tendency* of the class scores, also, can be readily noted by first noting the highest point on the curve and then following it down vertically in order to find out what the score is for the highest point. This is the score made by the largest number of pupils and on the curve it is known as the *modal point*, or more briefly, the *mode*. A comparison of modes indicates the extent to which one group resembles another group in the ability measured.

Other measures of " central tendency " are the *mean* (the arithmetical average of the scores of all of the individuals in the group measured) and the *median* (the score of the individual who stands halfway between the individual with the highest score and the individual with the lowest score; if the individuals constitute an even number, the average of the scores of the two midmost individuals is taken as the median). The significance of the terms " mean " and " median " will be apparent from an inspection of the following table;

TABLE I

DISTRIBUTION OF THE SCORES OF 15 PUPILS ON TWO TESTS

1st Test		2d Test	
Pupil	Score	Pupil	Score
A	90	C	98
B	89	A	92.8
C	87	D	92.5
D	85	F	89
E	82	M	88
F	81	I	87
G	80	B	84
H	79 ←Median	J	81 ←Median
I	75	E	77
J	74	G	75
K	71.7	K	74
L	71.3	N	73
M	70	H	71
N	58	L	70
O	30	O	68
Sum	1123.0	Sum	1220.3
Mean	74.8	Mean	81.3
Median	79	Median	81

In comparing two groups as to the *general levels* of their achievements or abilities, the median is usually a more reliable measure than the mean or average because extreme and exceptional cases affect the latter in a way that they do not affect the former. In Test 1 of Table I, for example, the very low score of Pupil O pulls down the average of the group, and the mean here would be a deceptive index of the general level of achievement of the group as a whole. In Test 2, however, the scores were more evenly distributed and it would make little difference whether one used the mean or the median as the measure of the group's achieve-

ment-level, since the two measures reveal almost the same central tendency.

Correlation. It is often desirable to know how traits compare with one another both in individuals and among groups. What, for example, is the relation between the ability of pupils in spelling and their ability in arithmetic? There are several methods of making such comparisons. Suppose in Table I that Test 1 is an arithmetic test and Test 2 a spelling test. One may see by mere *inspection* that in general the pupils who did well in arithmetic also did well in spelling, but the correlation is very far from perfect, for a perfect correlation would mean that each pupil held the same rank in both tests, and that the pupils in both tests were separated from one another by intervals of the same magnitude.

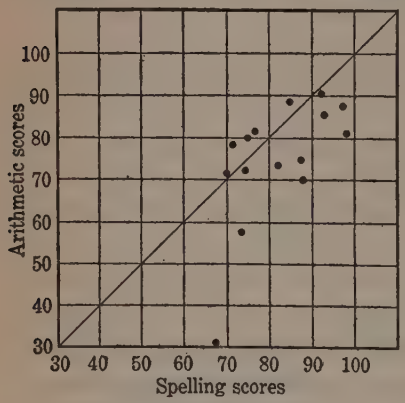

Fig. 15. A scatter diagram.

The scatter diagram. Estimating the degree of correlation by inspection can be made more nearly accurate by constructing a "scatter diagram." Let the vertical distances on the diagram represent the arithmetic scores, and the horizontal distances, the spelling scores, and let the scores read from the lower left-hand corner upward for arithmetic and to the right for spelling. One then makes a dot for each pupil indicating where his arithmetic score crosses his spelling

score. If these dots fall on or very close to a diagonal line drawn from the lower left-hand corner to the upper right-hand corner, it is obvious that there is a very close direct relationship between the abilities in arithmetic and the abilities in spelling. In the degree that the dots depart from this distribution the relationship is less close. If the dots tended to fall on a diagonal line drawn from the lower right-hand corner to the upper left-hand corner, the relationship would approach a perfect " negative correlation " for this would mean that the pupil who made the lowest score in arithmetic made the highest score in spelling and *vice versa;* and that all of the other pupils had ranks in arithmetic just the opposite of the ranks that they held in spelling.

The coefficient of correlation. Still another means of determining degrees of relationship is, to compute, through a correlation formula, the *coefficient of correlation.*[1] This procedure has an advantage in some instances in that it permits one to express numerically the degree of relationship or parallelism existing between measurements of different traits. The coefficient of correlation is usually represented by the symbol r. It is derived by a somewhat complicated computation which takes account of the degree in which each individual's score varies from the average of all

[1] The mathematical computation of correlation was introduced about 1886 by Sir Francis Galton (1822–1911). In addition to his important work in the scientific study of mental heredity, Galton was one of the pioneers in applying mathematics to social and psychological problems. He laid many of the bases of the present-day science of statistics and was the first person to make a statistical study of the inheritance of talent. His best-known book, *Hereditary Genius,* was published in 1869, ten years after his famous cousin, Charles Darwin, published *The Origin of Species.*

of the scores on each of the two tests or measurements that are being compared. The formula is so constructed that a perfect positive correlation will yield an r of 1.00; a perfect negative correlation, an r of -1.00; the absence of any relationship or correlation whatsoever, an r of 0; while any other degree of relationship will be represented by the decimal fractions from 0 to 1.00 in the case of the positive or direct relationships, or from 0 to -1.00 for negative or inverse relationships.

Some notion of the degree of relationship represented by correlation coefficients of varying magnitudes may be gained from the following comparisons. We all know that brothers tend to resemble one another in physical traits. But the tendency of brothers who are twins to look alike is much stronger than of brothers who are not twins. A large number of measurements of physical traits (such as height, weight, physical strength, and the like) have been applied to many pairs of brothers who are not twins. The correlations among these traits have then been determined by the application of the formula and the resulting r's for physical traits have been found to average about 0.52. The same physical traits have also been measured for many pairs of twins; here the average of the r's is about 0.80.

The correlation coefficient may also be illustrated by reference to the comparisons revealed in Table I. It will be recalled that mere inspection reveals a positive or direct correlation between the traits or abilities assumed to be measured by the two tests. But how close is the correlation? Is it as close as the physical resemblance between twins, for example? We may determine this by computing the correlation coefficient which in this case is 0.70 or somewhat below twin-resemblances.

The "probable error." Very important in interpreting a correlation coefficient is what is called its "probable error." Only when large numbers of indi-

vidual measurements are made can one assume that apparent relationships disclosed by correlation are anything more than the products of chance or accident. Differences in the scores reported in Table I, for example, may be due to purely accidental conditions, and a repetition of the tests might result in a quite different distribution of scores. When large numbers of cases are considered, however, or when tests are repeated several times (but at sufficiently long intervals or with sufficiently different test-materials to minimize the influence of practice), the accidental factors tend to neutralize one another, and in many cases one may be reasonably certain that a true relationship is revealed. The trustworthiness of any r may be obtained by computing its " probable error " which indicates the range within which the r is likely to vary if a very large number of cases were considered.

The correlation computed from Table I rests on too few cases to be at all reliable. If an r of 0.70 were obtained from similar tests given to one hundred pupils, the probable error would be .0345; the chances are even that if the tests were given to a thousand or ten thousand pupils of the same age and grade, the coefficient of correlation would not be less than 0.6655 nor more than 0.7345.

New-type examinations. In order to measure achievement in school subjects, standardized tests have been developed in practically all phases of elementary and secondary education. These tests differ from the essay-type examination which classroom teachers were accustomed to give. They are for the most part short-answer tests, and because the answer to each question is wholly right or wholly wrong in most forms of these new-type tests, it is objective;

that is, the score is not affected by the opinion of the examiner. It has been found that teachers' ratings of pupils' examinations are often unreliable because they have been subjective. Not only do different teachers disagree regarding the grades assigned to a set of papers, but investigations have revealed that if teachers are asked to grade the same sets of papers twice, allowing a short interval to elapse between the first and second grading, the two ratings given to each paper will vary to a considerable degree. In order, then, to rate pupils more accurately the modern teacher has appropriated the techniques of standardized tests, and he or she now makes and gives new-type examinations. These examinations are of various kinds, including the true-false, completion, multiple-choice, and matching or pairing tests.

True-false examinations. The true-false test in its usual form consists of a series of statements (preferably not fewer than fifty), approximately half of which are true and half of which are false. The pupil writes the letter *T* (*true*) or *F* (*false*), as the case may be, in the margin before each statement. Sometimes both words *true* and *false* or *T* and *F* appear before each statement, in which case the pupil underlines or encircles the correct answer. Another form of the true-false test is one made up of a series of questions to be answered by *yes* or *no*.

The two chief advantages of the true-false test are (1) that it is objective and (2) that it is readily scored. In scoring, in order to eliminate the element of chance and penalize for mere guessing, the teacher should subtract the number wrong from the number right.

That is, if there are 100 statements in the test and the pupil answers all the questions and fails on 10 of them, his score will be 80, since he had 90 statements marked as they should be and 10 marked incorrectly. If, on the other hand, a pupil answers but 90 of the 100 statements and of these 90 he marks 80 correctly and 10 incorrectly, his score is 70. He is not penalized so heavily for his omissions as he would be if he had answered incorrectly. It is generally considered a sign of better scholarship to know you do not know than to think you do when you do not.

The following statements based on this chapter illustrate what is meant by a true-false test.

(*T*) 1. Subjective ratings based upon opinion are highly unreliable.
(*F*) 2. All learning curves are practically alike.
( ) 3. Plateaus indicate periods of measurable improvement.
( ) 4. Plateaus are often due to lack of interest.
( ) 5. The rate of forgetting increases as the time interval after learning increases.
( ) 6. Most persons possess an average amount of any trait.
( ) 7. The normal curve of distribution is symmetrical.
( ) 8. Correlation measures relationship.

Completion tests. The completion test is used rather widely, but it is not usually so well liked by pupils as the true-false test. In completion tests certain important or " key " words or phrases are omitted from the context of the test, the pupil filling in the blanks with the appropriate responses.

The advantage of the completion test is that it is objective although not so much so as the true-false test because sometimes several responses may be made which may be equally correct or which, although not worth so much credit as the answer that the teacher

expected, are not incorrect and should receive some credit. Another objection to the completion test is that it puts too much emphasis on mere memory. This disadvantage can be overcome by couching the the language of the test in words other than those used in the texts or in class discussions.

The following incomplete statements illustrate a completion test.

1. The —— of learning is illustrated by the —— curve.
2. A —— range indicates that the class is not ——.
3. Periods of no —— improvement are indicated on the —— curve as ——.
4. Central tendency is indicated by the ——, ——, and ——.
5. Correlation, which is a measure of ——, is usually indicated by the symbol ——.
6. The great advantage of new-type tests is that they are ——.
7. The —— —— indicates the —— of the *r*.
8. The —— is usually a more reliable measure of central tendency than the ——.

Multiple-choice examinations. In multiple-choice examinations three or more answers to each question are given in the test and the pupil is to indicate which one of the answers is the best. An example is " The World War began in (1900, 1910, 1914, 1918)." Of course " 1914 " is underlined because it is the correct answer. The material may be presented in question form as " Which of these rivers is in South America? (Amazon, Congo, Ganges, Nile.) " This type of test is wholly objective and readily scored. Multiple-choice tests, however, are difficult to make. Care must be taken that none of the answers given are absurd. Then, too, unless very carefully constructed the multiple-choice test is likely to be much easier than

the completion test, for it is easier to recognize than to recall a correct answer. (See p. 169.)

The following illustrates a multiple-choice examination:

1. A measure of central tendency is the (range, mean, correlation, I.Q.).
2. The most reliable measure of general level of achievement is the (mean, probable error, mode, median).
3. The degree of correlation can be estimated by inspecting a (normal curve, scatter diagram, skewed distribution, probable error).
4. The trustworthiness of r can be obtained by computing the (mean, range, correlation, probable error).

Matching or pairing tests. This type of test is not used so frequently as are the forms already mentioned. There are various ways in which matching tests are presented. Sometimes a series of causes and a series of effects are listed. The pupil matches or pairs each cause with the effect which resulted from it. The causes are numbered while parentheses instead of numbers are placed in front of each effect. The pupil inserts the number of the correct cause within the appropriate parentheses. Often more causes are listed than effects so that guessing at the end may be eliminated. Another form often used in history is to give two lists of events, one event in each list having occurred at about the same time. Still another form is to have two lists, one item in one list being associated with one and only one item in the other list. This type lends itself to many kinds of subject matter.

An illustration of the matching or pairing test follows:

Direction: Place before each term in the second column the number of the term appearing in the first column which is associated with it.

1. Probable error	( ) Reliability measure
2. Subjective	( ) Learning curve
3. Mean	( ) Plateaus
4. Objective	( ) Central tendency
5. Rate of learning	( ) Essay type of examination
6. No measurable improvement	( ) New-type tests

Advantages and disadvantages of new-type tests. The chief advantage of the new-type tests lies in their objectivity. Another advantage is that they are easily and quickly scored. They can be made to cover more ground, too, than the essay type of test. They are more interesting and require much less writing by pupils than does the essay type of examination. Most pupils find these new-type tests less fatiguing than those formerly used and, if well constructed, they help in the diagnosis of pupil difficulties. The chief disadvantage of new-type tests is that they offer no opportunity for pupils to organize their ideas and permit no free expression. They are also much more difficult to make than the essay type of test, and thus take much longer to construct.[1] Another disadvantage lies in the fact that it is much easier for pupils to copy from their neighbors' papers in new-type tests than in the essay-type tests.

Summary. Measurement has proved many things which we have believed true in regard to behavior. It has also brought out many facts about which we knew very little. One great advantage of measure-

[1] Not infrequently publishers will furnish, at small cost, new-type tests to be used in connection with the textbooks that they issue.

ment is that its findings can be set down graphically. Heretofore we have had to be content with the opinions of experts on various aspects of behavior. Expert opinion still is and always will be valuable, but it is subjective and affected by human prejudices and biases. Measurement minimizes the influence of the subjective element. It provides objective measures which vary but little, no matter who does the measuring.

Among the important contributions of measurement are the new-type tests. These are short-answer tests and are wholly objective in most instances. Although they are difficult to make, they are much more quickly taken and are more quickly and more easily scored than the essay-type examination.

Definitions and Explanations of Terms Used

Learning curve. A graphic representation of the rate at which one has learned a specific skill.

Curve of forgetting. A graphic representation of the rate at which one forgets a specific skill which one has learned.

Plateau. A flat portion on a learning curve illustrating graphically a period of no measurable improvement.

Distribution curve. A graphic representation of the frequencies with which various amounts of a trait or skill are distributed within a group.

Central tendency. That amount of a trait or skill which represents the general level of the achievements of a group. The mean, median, and mode are measures of central tendency.

Correlation. A measure of relationship, resemblance, or parallelism between two traits. If in a large group the same individuals tend to maintain the same rank in two traits there is said to be a close positive correlation between the two traits.

Probable error. A measure of reliability often used to determine the trustworthiness of a correlation coefficient.

Objective tests. Short-answer tests in which the answers are either wholly right or wholly wrong.

QUESTIONS AND EXERCISES

1. What does a plateau in a learning curve signify? What may cause plateaus? What should be done about them?

2. Describe the normal curve of distribution. How do skewed distributions differ from normal distributions?

3. What is meant by "measures of central tendency"? How does the mean differ from the median? Which is usually the more reliable and why?

4. Discuss correlation. Of what value is the probable error in interpreting the coefficient of correlation?

5. How would you go about constructing a scatter diagram? What would be the outstanding difference between a scatter diagram which indicated very close positive correlation and one which indicated high negative correlation?

6. Name and illustrate the various kinds of new-type examinations. What are the advantages and disadvantages of each? Contrast them with the traditional essay type of examination.

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CHAPTER XIV

INDIVIDUAL DIFFERENCES: INTELLIGENCE

In the preceding chapters we have discussed, among other topics, feelings, habits, perception, imagination, judgment, and reasoning. In the present chapter it will be shown that while almost all individuals feel, form habits, perceive, imagine, judge, and reason, measurement has revealed that the extent to which they do these things varies widely.

Nature of individual differences. *Individuals vary in every measurable trait* and probably in those for which no satisfactory measures have as yet been devised. Ordinary observation tells us that some men are very tall, others very short, while a much larger number are in the middle ranges. If we measured a large number of people taken at random we should be able to find one or more men of almost every height from the very short to the very tall. Persons cannot be classified readily into distinct groups in regard to height. The point at which we call one man short and another medium sized is an arbitrary one. So it is with differences in mental traits: we are unable to say with any degree of certainty where the normal individual leaves off and the superior individual begins, or where the dividing line falls between the normal and subnormal individual. There is no doubt, however, that some persons are decidedly short, others decidedly tall;

while some persons are obviously idiots and others apparently geniuses.

Causes of individual differences. Differences among individuals are due to two factors, heredity and environment. These operate either singly or jointly. By heredity is meant all that is biologically predetermined in the life of the organism because of its ancestry. Certain of the so-called inherited traits are susceptible of modification; that is, these traits as they appear in an adult are not due entirely to heredity. By environment is meant everything that affects the organism which is not due to heredity. Environmental influences may be exerted by the home, the school, companions, food, climate, books, government, opportunities economic status, and countless other factors.

Differences among individuals may be classified as physical (including differences in bodily structures and functions) and mental (including differences in intelligence, emotional tendencies, and character traits).

Heredity *vs.* environment. It is a question of long standing whether heredity or environment is the more potent cause of individual differences, especially of differences in intelligence and character. Such a question is still unanswerable with reference to a large number of observable differences, but fairly definite statements may be made within restricted fields. Some general truths, too, are well established. Given an ideal heredity, for example, an individual with a thoroughly bad environment will doubtless be unable to reach the heights which a fine heredity plus a good environment would make possible. Given a very poor heredity an individual would doubtless benefit but

little by even the best environment. It is reasonable to believe that a good heredity can overcome many handicaps in environment, and that an imperfect heredity may be offset in many ways by a favorable environment.

When both a poor heredity and a bad environment affect the same individual the result is more disastrous than if either factor alone is present. When a good heredity and a favorable environment affect the same individual the result is more satisfactory than if either factor alone operates. Generally, persons of good heredity see to it that their environment is relatively favorable; hence the two factors are often found operating together. Persons with a long line of mentally inferior ancestors, on the other hand, may have to accept and remain in a poor environment.

It is important to remember that since nothing can be done to improve the heredity of a child after birth, everything that is possible should be done to improve his total environment.

Physiological and anatomical differences. Physiological and anatomical differences are determined almost entirely by heredity. Eye-color, hair-color, height, length of arm, size of feet, shape of the head, and the like are for the most part inherited. Environment, however, may affect certain of these traits. For example, lack of adequate food may prevent an individual from acquiring the height which his inheritance would otherwise make possible.

Differences in temperament. It is difficult to say what part heredity plays in regard to temperament or emotional tendencies. No matter how cheerful a tem-

perament one may inherit, such a person will not be likely to develop so happy a disposition in a miserable environment as he would in one which is favorable. A pleasant environment need not mean that the individual be surrounded with luxury, nor need a miserable, unhappy environment signify one of poverty. Indeed the reverse may be true. It is believed the secretions of the endocrine glands have a powerful effect on temperament. (See p. 95.) Glandular functions seem to be determined largely by heredity but they may be affected by environmental factors, as when a deficiency in the thyroid secretions is made up by taking extracts prepared from the thyroid glands of sheep.

Nervous and emotional stability is probably determined in large measure by one's inheritance, but environment may play a very important part in the nervous and emotional life of the individual. One who is emotionally unstable because of an inherited predisposition may live in an environment which does not excite the emotions. On the other hand, an individual who is by inheritance nervously and emotionally stable may be placed in an environment of stress, strain, and excitement which may offset the favorable heredity. Attempts have been made by Downey, Voelker, Woodworth [1] and others to measure the emotional equipment of individuals but as yet such measures are less reliable than measures of intelligence.

Character differences. Character differences will be discussed in detail in a subsequent chapter. Probably

[1] Robert Sessions Woodworth (born 1869) has been Professor of Psychology at Columbia University since 1909. Two of his well-known works are *Dynamic Psychology* and *Psychology — A Study of Mental Life.*

no differences are more obvious than these. Some persons behave honestly, others behave dishonestly; some work industriously, others fritter away their time; some carry large responsibilities, others evade and shirk the simplest duties; some tell the truth, others lie; some behave loyally, others disloyally. Most persons, however, are tolerably honest, truthful, industrious, dutiful, and loyal. Results of investigations concerning character differences are discussed in Chapter XVI.

Sex, race, and nationality differences. Although individuals vary in every measurable trait, not all kinds of differences are equally significant. Most of the alleged mental differences between the sexes and among the races and nations are greatly overestimated. Differences in intelligence due to nationality are scarcely worth the teachers' consideration, for the evidence is meager and the differences are inconsequential. Some racial differences in intelligence are significant in the sense that one should not expect the same *average* achievement from certain races as from others. It would be unjust to assume, however, that, because an individual belongs to a race that has a high average intelligence, he himself is necessarily superior to an individual belonging to a race with a lower average intelligence.

The sexes differ in physiological traits, to be sure, but most of the differences in personality, attitudes, and intelligence which are due to sex are negligible when subject to the same environmental conditions. Boys tend to be courageous largely because society expects them to be so, just as girls like to play "house" partly because the environment supplies the materials and society expects girls to play with them.

Differences in intelligence. When individual differences are discussed it often happens that only differences in intelligence are considered. Are these differences due to heredity, or to environment, or to both? Many have held that they are due entirely to heredity while probably no one holds that they are due to environment alone. Some psychologists have believed that both heredity and environment cause the differences. It has been known for a long time that persons vary in their ability to learn. Teachers have had in the same grade pupils of widely different ages, while children of the same age are found distributed through several grades. In a recent survey, children twelve years of age were found in every grade from the second through the eighth. We have long since recognized one child as bright and another as dull, but objective measurement of intelligence is a fairly recent achievement.

The measurement of intelligence. As early as 1880 attempts only partly successful were made to measure intelligence.[1] It was not until the present century, however, that Alfred Binet,[2] a French psychologist, made the first significant contribution toward an objective means of answering this question. The educational authorities of Paris asked him to devise some

[1] Hermann Ebbinghaus (1850–1909), believing intelligence to be a single unitary power, sought a single test for the measurement of intelligence. Ebbinghaus also experimented extensively in the field of memory.

[2] Alfred Binet (1857–1911) worked most of his life on devising scales by which to measure intelligence which he believed to be a complex of abilities. The first scale (1905) was the result of his efforts solely. The Binet Scales appearing later (1908, 1911) are the work of Binet and Theodore Simon, a French physician.

means whereby children who were so low in intelligence that they were unable to profit by ordinary school experience might be detected in order that other educational provisions could be made for them. With a colleague, Theodore Simon, Binet devised tests which were standardized by giving them to thousands of children. The range of scores for each age was computed, and that score which the largest proportion of the children of each age group made was taken as the standard or normal score for the age in question.

While first devised for the detection of feeble-mindedness among school children, these tests soon came to have wider uses. If a question arose as to whether a boy or girl who was guilty of some delinquency was normal or subnormal, he or she could be given the test, and if the resulting score tallied with the age-standard, he or she could be regarded as normal. If the score fell significantly below the standard for the age group, the conclusion would be justified that he or she was subnormal. If it fell very far below the age standard and was no more than a score that a very young normal child could make, one could justly infer that, in spite of chronological age, the individual had the mind of a very young child and could consequently not be held morally responsible for his acts. Such information proved to be of great value to judges who had hitherto been perplexed in many cases as to whether a young delinquent should be sent to a reformatory or to an institution for the feeble-minded.

Kinds of intelligence tests. Intelligence tests may be either individual or group tests. The early tests were of the individual type. Such tests are time-consuming

and hence costly to administer, so intelligence testing for over a decade was primarily confined to the detection of feeble-mindedness. Group intelligence testing had its inception at the time of the World War when the Army Tests were devised by a group of psychologists under the leadership of Robert L. Yerkes and administered to our soldiers in the training camps. Since the advent of group intelligence tests, which permit large numbers to be measured at one time and are therefore more economical although probably somewhat less accurate than the individual tests, intelligence testing has gone forward very rapidly.

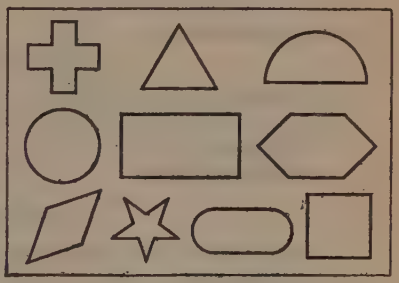

Fig. 16. The Goddard-Sequin Form Board, used as an individual performance intelligence test.

Both individual and group intelligence tests may be either verbal or nonverbal, the latter being commonly called performance tests.[1] The difference between these two types of tests lies in the fact that while verbal tests require a knowledge of written or spoken language, performance tests do not. The Army Alpha tests are verbal while Army Beta tests, which were used to test native-born illiterate soldiers and foreign-born soldiers unfamiliar with English, are performance tests.

[1] Walter Fenno Dearborn (born 1878), well known through his series of intelligence tests for use in the elementary grades, has done outstanding work in the field of performance (non-verbal) tests. He has been a professor at Harvard University since 1912.

GODDARD REVISION OF THE BINET–SIMON SCALE.

An individual verbal test.

Age 3 years

1 Points to nose, eyes, mouth.
2 Repeats "It rains. I am hungry."
3 Repeats 7 2.
4 Sees in Picture 1.
2.
3.
4.
5.
5 Knows name.

Age 4 years

1 Knows sex, boy or girl (girl or boy).
2 Recognizes key, knife, penny.
3 Repeats 7 4 8.
4 Compares lines.

Age 5 years

1 Compares 3 and 12 grams; 6 and 15.....
2 Copies square.....
3 Repeats: His name is John. He is a very good boy.....
4 Counts four pennies.....
5 "Patience".....

Age 6 years

1 Morning or afternoon.....
2 Defines fork, table, chair, horse, mamma.....
3 Puts key on chair, brings box, shuts door.....
4 Shows right hand, left ear.....
5 Chooses prettier.....

Age 7 years

1 Counts 13 pennies.....
2 Describes pictures.....
3 Sees picture lacks eyes, etc.....
4 Can copy diamond.....
5 Names colors, red, blue, green, yellow.....

Age 8 years

1 Compares two objects from memory; butterfly, fly: wood, glass: paper, cloth.....
2 Counts backwards 20 to 1.....
3 Repeats days of week.....
4 Counts stamps 111222.....
5 Repeats 5 figures.....

Age 9 years

1 Makes change, 20c, 4c.....
2 Definitions better than use.....
3 Knows date.....
4 Repeats months in order.....
5 Arranges 5 weights.....

Age 10 years

1 Knows money 1c, 5c, 10c, 25c, 50c, $1, $2, $5, $10.....
2 Draw design from memory (Show 10 sec.).....
3 Repeats six figures: 854726, 274681, 941738.....
4 Comprehends easy questions.....
5 Uses 3 words in two sentences.....

Age 11 years

1 Sees absurdity; painter, brothers, locked in room, railroad accident, suicide.....
2 Uses 3 words in a single sentence.....
3 Gives 60 words in three minutes.....
4 Gives three rhymes.....
5 Puts dissected sentences together.....

Age 12 years

1 Repeats 7 figures.....
2 Defines charity, justice, goodness.....
3 Repeats sentence of 26 syllables.....
4 Resists suggestion.....
5 Problems: (*a*) Hanging from limb.....
(*b*) Neighbors, visitors.....

Mental age. As the investigations proceeded, it was found that some adults, when subjected to the tests, disclosed the fact that their minds were really

children's minds. A feeble-minded person of thirty might be unable to surpass the normal score of the eight-year-old group. The psychologists then began to classify subnormal and supernormal persons of all chronological ages according to their *mental* ages. One who did no better than the standard eight-year-old score on the tests was said to have the mind of an eight-year-old child or to have a mental age of eight years. In a similar fashion, supernormal children eight, nine, or ten years of age who made the standard score for the twelve-year-old group were regarded as having a mental age of twelve. The normal mental age is determined by the score made by the largest number of children of the corresponding chronological age; hence the normal child who is twelve years old chronologically is also twelve years old mentally. A person who is of normal mentality is an average individual. If he falls significantly below the average or norm, he is subnormal; if he is significantly above the average or norm, he is supernormal.

The intelligent quotient. A very convenient method of indicating one's degree of intelligence with reference to the norm of the age-group was devised by Lewis M. Terman,[1] a brilliant American psychologist. The ratio of mental age to chronological age, multiplied by 100, he termed the " intelligence quotient." Thus a person whose chronological age (C.A.) is twelve and whose mental age (M.A.) is likewise twelve has an intelligence

[1] Lewis Madison Terman (born 1874) has been Professor of Education at Stanford University since 1910 and is one of the most prominent leaders in the movement to measure intelligence. He is the author of *The Measurement of Intelligence* and other books and has made studies of outstanding merit on the education of gifted children.

quotient or "I.Q." of $(12 \div 12) \times 100$, or 100. If his C.A. is twelve and his M.A. fifteen, his I.Q. is $(15 \div 12) \times 100$, or 125. If his C.A. is twelve and his M.A. is nine, his I.Q. is $(9 \div 12) \times 100$, or 75.

The meaning of the intelligence quotient. The psychologists are not wholly agreed as to what it is that the intelligence tests measure, and this is equivalent to saying that there is not full agreement as to what the I.Q. means. The definition upon which there seems to be most agreement is that the tests measure one's capacity for learning, and especially the capacity for learning in terms of meanings or concepts (see pp. 210 ff.). A person with a high degree of intelligence (or a high I.Q.) may consequently be regarded as one who has an unusual capacity for what we have termed "conceptual thinking" (p. 211).

According to this definition, one may interpret the intelligence quotient as indicating one's ability to learn on the conceptual level in comparison with the ability of the average of one's age group to learn on this level. A person with an I.Q. of 125 may be thought of as having one-fourth more ability for such learning than the average individual of his age; a person with an I.Q. of 75 has only three-fourths of the normal ability to learn; and so on. Theoretically, an I.Q. of 125 would enable one to learn in three units of time what the normal individual would require four units of time to learn; while an I.Q. of 75 would so handicap its possessor that he would require five units of time to learn what the normal individual could master in four units of time. Practically, however, the differences in capacity may be much wider, for there are some

conceptions readily grasped by an I.Q. of 125 which would be extremely difficult for the normal mind and quite beyond the I.Q. of 75.

The criteria of "normal," "supernormal," and "subnormal." It will be recalled (p. 234) that, on every measurable trait, large unselected groups tend to be so distributed that a large number of individuals fall in the middle ranges, while relatively small numbers are found at either extreme. Measurements of intelligence follow this general tendency. When large numbers of representative individuals are considered, the "mode" is likely to be I.Q. 100. Those with I.Q.'s between 90 and 110 are usually considered as belonging to the normal group. A widely used plan of classification is as follows: —

Below 25	Idiot
25–49	Imbecile
50–64	Moron
75–89	Dull normal
90–110	Normal
111–119	Bright
120–130	Very bright
Above 130	Superior

The question of the constancy or persistence of the I.Q. An advantage once claimed for expressing mental ability in I.Q. rather than in mental age was the assumption that while mental age increases up to a certain point with chronological age, the I.Q., which represents the ratio of mental to chronological age will remain constant. In other words, while mentality grows from infancy to maturity, it was assumed that this growth is always strictly proportional to one's inborn capacity; consequently one's position as compared with the mem-

bers of one's age group would always be essentially the same.

On the whole the results of thousands of measurements seemed to bear out this assumption, for a substantial proportion of those measured from year to year maintained approximately the same ratio between mental and chronological age. Some students of the problem, however, held that this was due very largely to the fact that the environmental factors, which, they believed, operated to stimulate mental growth, did not vary widely for the groups that were considered and consequently that the "constancy of the I.Q." was explainable in part by the constancy in the operation of environmental forces. Others maintained just as stoutly that environment had but a negligible effect on mentality. It influenced what the mind did with its ability, but it did not affect to any great extent the ability itself. This ability was the product, they maintained, of purely native or inherited forces.

The controversy that arose over this question was greatly stimulated by the publication of the results of the intelligence tests given to the American soldiers at the time of the World War — by far the most extensive testing program that has yet been undertaken. The tests were so administered that their results may fairly be considered as reflecting a cross-section of American "intelligence," especially in view of the fact that the soldiers were drawn impartially from all economic groups between the ages twenty-one to thirty-one. They also represented all sections of the country. The published results of the tests seemed to indicate, first, that the general level of intelligence in the nation as a

whole was much lower than anyone had suspected, and secondly that there were very wide differences in intelligence both among the native-born citizens of the several states and among the different nationalities represented in the foreign-born draft. In the interpretation of these results, the question whether the tests measure only *inborn* capacity became of very large importance. If mentality were not influenced by such environmental forces as home training and school education, the success of a social order based upon equal rights and privileges seemed extremely questionable.

Facts and arguments were set forth by both parties to the controversy, and the old question of "heredity *vs.* environment," of "nature *vs.* nurture," came sharply into the forefront both of academic and of public discussion. The whole theory and practice of democratic government was assailed by one side and defended by the other. The futility of attempting to educate the great masses beyond the elementary-school level was widely proclaimed. The term "moron" became a byword of popular speech, and a school of literary criticism developed which has made much of the assumption that most people are not only insufferably but incurably stupid. The results of the Army intelligence tests were drawn upon to prove the inequality, not only of such major races as the Caucasian and the Negro, but also of diverse national stocks among the white peoples; and the immigration laws that are now upon our statute books have been powerfully influenced by these arguments.

The issue really turned upon the theory of the "constancy of the I.Q.," and elaborate investigations were

finally undertaken in the effort to provide a definite and unambiguous answer to this question. What has seemed to be such an answer came in 1928 with the publication of a voluminous report by a committee under the chairmanship of Professor Terman. Among the investigations embodied in this report, two are generally conceded to offer dependable evidence that "nurture" has a significant although a limited influence in determining one's mentality, and that changes may be and often are effected in the I.Q. by environmental forces.

The two investigations referred to were conducted independently by Frank N. Freeman,[1] of the University of Chicago, and by Miss Barbara Burks, of Stanford University. Both attacked the problem in essentially the same way. They compared the intelligence quotients of adopted children with those of their foster brothers and sisters and with those of their own brothers and sisters who had remained in their own homes (or who at least had been brought up in different environments from those of the adopted children). If "nature" or heredity alone is potent in determining mentality, it is clear that family resemblances will persist even though children of the same family are brought up in different environments; if "nurture" or envi-

[1] Frank Nugent Freeman (born 1880) has been a member of the School of Education in the University of Chicago since 1909. He is the author of a number of books in the field of psychology including *The Teaching of Handwriting*, *How Children Learn*, and *Mental Tests*. It may be noted from these titles that Professor Freeman's chief interest lies in the field of measurement. He has devised a diagnostic scale for measuring handwriting and was one of the first investigators to study the educational possibilities of the moving picture.

ronment has some degree of influence it should operate to make foster children depart appreciably from their own brothers and sisters as regards their mental traits and to resemble appreciably their foster brothers and sisters. Both of the investigations established, apparently beyond cavil, the latter hypothesis. While Professor Freeman and Miss Burks differ somewhat in the interpretation of their results, both agree that the influence of nurture is significant. The more conservative interpretation is that of Miss Burks; namely, that a very favorable environment may, with a very few individuals, increase mentality by as much as twenty I.Q. points, while an unfavorable environment may depress one's mentality by the same amount. With the average individual a difference of not more than six to nine points either way can be anticipated. Professor Freeman believes that the influence of nurture may be even more profound — perhaps accounting in some cases for as much as one half of one's mental capacity.

It is almost beyond question, too, that there are a few individuals whose great capacities would override almost any environmental handicaps — "geniuses" who are bound to come into their kingdom in spite of any obstacle save premature death; just as there are certainly a few individuals at the other end of the scale whom no good fortune of nurture could raise above the level of the idiot or the imbecile.

The accomplishment quotient, A.Q. or A.R. One of the most important measures with which a teacher should be concerned is the accomplishment quotient or ratio, or achievement quotient, as it is often called.

As we have already seen, the intelligence quotient is an index of one's ability to learn, but what one is able to do is one thing, and what one actually accomplishes may be quite another. The accomplishment quotient, or A.Q., is a measure of what one achieves in terms of what one is theoretically able to achieve. It is computed by dividing the "educational age," or E.A., by the mental age, or M.A., and multiplying the result by 100.

The educational age, or achievement age, is determined by arranging the pupil's accomplishments as measured by achievement tests in the school subjects. Such tests have been developed by Courtis,[1] Starch,[2] and others.

There may be many achievement ages. For example, there may be a reading age, a language age, an arithmetic age, and an age for each subject which can be measured by an achievement test.

A pupil on entering grade four may have average sixth-grade reading ability, but may have only average third-grade ability in arithmetic while he has fourth-grade ability in spelling. His reading age would be eleven years. That is, he can read as well as average children entering grade six who are eleven years of age. His arithmetic age or achievement age in arithmetic would be eight

[1] Stuart Appleton Courtis (born 1874), Professor of Education at the University of Michigan, originated the *Courtis Standard Tests* for measuring efficiency of school work. Probably his most important contributions have been his arithmetic tests. For many years he was director of research for the public school system of Detroit.

[2] Daniel Starch (born 1883) was for many years a teacher of educational psychology at the University of Wisconsin. *Educational Measurements* and *Educational Psychology* are two of his well-known books. He has devised a number of achievement tests in the elementary-school subjects.

years, which is the age of normal children on entering grade three. His spelling age would be the same as his educational age since he has the average spelling ability of pupils in the fourth grade.

A pupil who has a mental age of 6 years has the mental ability of a normal 6-year-old child. If he is entering the first grade his educational age is 6 years, because this is the age of normal children entering first grade. Computing the A.Q. we find it to be 100. This means that the pupil is in the grade in which we may expect him to be in terms of his mental ability. A pupil whose M.A. is 10 years and whose E.A. is 8 years will have an A.Q. of 80. This signifies that he is not accomplishing as much as he should (theoretically) accomplish in terms of his mental ability. An A.Q. below 100 suggests that the pupil is not working with the maximum of efficiency. A pupil with an M.A. of 10 years and E.A. of 11 years, 6 months will have an A.Q. of 115. This indicates that he is apparently accomplishing more than his mental ability seems to warrant. An A.Q. above 100 means that the pupil seems to be accomplishing more than might be expected.

How is it possible for a pupil to accomplish more than he is mentally able to accomplish? There may be several answers to this question. He may have more mental ability than his score on the intelligence test credited him with having. Perhaps superior persistency or the putting forth of unusual effort has enabled him to score higher on the achievement tests than most children who have the same mental age. It will be recalled that in the chapter on habit we said, "*It is the intense effort that educates.*"

Investigation tends to show in general that persons with slightly lower than normal intelligence accomplish

more than their theoretical expectancy, while those with high I.Q.'s very seldom surpass their expectancy. In other words, persons with I.Q.'s slightly below 90 very often have A.Q.'s above 100, while persons with high I.Q.'s very seldom have A.Q.'s above 100 and often fall below 100.

This may be because teachers work more with the children who seem to learn slowly and do not require superior work from those with superior ability. Sometimes the children with better than average mental ability get into mischief and become "disciplinary cases" because they are not doing work so difficult nor so good as should be required of them. Not all of their ability is being used to advantage, hence it is being dissipated to the disadvantage of themselves, their classmates, and their teacher. At least this is one hypothesis advanced to explain the fact that duller pupils accomplish more in terms of their abilities than do brighter pupils.

The possibilities and limitations of formal education. It was said a few pages back that home environment has been proved to have a significant influence upon what was once regarded as purely native mental ability as reflected in the I.Q. Insofar as the influence of formal schooling on the I.Q. is concerned, the evidence is less emphatic, although far from negligible. The results of the Army intelligence tests show clearly that the draft quotas of soldiers from the several states tended to vary in their general levels of intelligence in proportion to the school facilities that these states had provided, and that the different nationalities represented by the foreign-born draft likewise tended to vary in intelligence in proportion to the school facilities that their countries of origin had provided. Various factors connected with these comparisons afford fairly

conclusive evidence that the variations in intelligence should be attributed in part to schooling. There is some evidence, too, that different school subjects *may* have varying effects upon the I.Q., although it has not been clearly demonstrated that this effect is large enough to be considered significant. On the other hand, there is no satisfactory evidence that regularity of school attendance influences the I.Q.; indeed, the most recent studies (quite limited, however, in the range that they cover) disclose no influence whatsoever.

In the light of our present knowledge it seems highly probable that the positive effects of school education upon mentality are both more important and more readily discernible in large population-groups than in the individual or among small groups of individuals. It seems incontestable that environmental forces can and do operate within limits to raise or depress the I.Q., but insofar as the school up to a certain point operates upon practically everyone in about the same way, its influence on the I.Q. will not be easily detected, since we determine each individual's I.Q. by the average of his group, and since the whole group is advancing under essentially the same type of stimulation. Only when we compare large groups of *well-schooled* individuals with large *unschooled* groups of the same racial stock would significant differences due to schooling be likely to appear.

One may go even further than this. Even though the actual gain in mentality due to schooling should be found to be insignificant for the individual, yet if millions of individuals through the operation of the same forces make the same proportionate gains, the

actual results of this raising of the mass-level of intelligence may well account for many of the differences between enlightened and backward nations and, in our country, for the differences between progressive and backward states. There is every reason for the teacher to cherish even tiny gains in the intelligence of his pupils — that is, in their capacity to learn on the conceptual level.

And the school should not deem itself a failure if it finds that a few men of little formal schooling climb to loftier heights than those that a great many highly educated men achieve. It is biologically inevitable that a rare combination of the native talents which make for the most distinguished success will appear every now and again, and those possessing these talents are sometimes able to do for themselves not only what instruction and training and discipline alone can do for the great masses but much more.

The important point is that what genius achieves is significant precisely in the degree that it can be brought into the service of the great masses. The school cannot guarantee to produce on order a great writer; but the school can teach millions of people to read and so give to the great writer not only a market for his wares but also a field through which to extend his influence. The school cannot guarantee to produce on order a great political leader — a Lincoln or a Roosevelt; but universal education and apparently only universal education can make it possible for a large nation to govern itself democratically under such leaders, rather than to be forced to submit to the autocratic rule of dictators or kings. The school cannot

produce on order a Henry Ford, but the American public school has been an important factor in making it economically possible for two families out of every three to own automobiles.

Provisions for individual differences. The school authorities provide for individual differences among pupils in many ways. There are, for example, schools for the blind, schools for crippled children, Americanization classes, evening schools, vocational schools, fresh-air classes, schools for the mentally defective, and classes for retarded children. Some cities maintain classes for cardiac cases and for children with defective eyesight. There are other provisions made for differences among school children such as milk for the undernourished, frequent rest periods for the nervous, dental clinics, and hot lunches for those children who are improperly fed. Children are grouped into fast-moving, average, and slow-moving sections; some are required to cover the maximum course of study, others cover the average or the minimum course.[1] Electives are another means of providing for individual differences, as are also maximum and minimum assignments. That school in which "every day is a promotion day" is fully aware of the extent to which individuals vary.

Summary. Individuals of the same age differ in every trait that has ever been measured. We also have observed that persons differ in traits which as yet have not been scientifically measured. Individual differences are due to heredity and environment. It is

[1] There are still differences of judgment as to the wisdom of segregating for special instruction children of different grades of ability as determined by mental tests.

impossible to say which of the two causes is the more important. In the study of psychology we are chiefly concerned with differences in general intelligence. By general intelligence we mean the native capacity to learn, to benefit by experience. The rate of mental growth is indicated by the intelligence quotient or I.Q. The range of the I.Q. of normal individuals is approximately from 90 to 110. An I.Q. which is considerably below 90 indicates that the individual is unable to learn as rapidly or as easily as a normal individual. An I.Q. which is considerably above 110 indicates that the individual is probably able to learn more rapidly and easily than a normal individual. Intelligence is due largely to nature but nurture has a significant although a limited influence upon it. The teacher should be concerned primarily with the accomplishment of the pupils, *i.e.*, with what they do in terms of the mental ability that they possess.

Definitions and Explanations of Terms Used

Heredity. The cause of all traits which are not acquired either during the prenatal period or after birth.

Environment. All factors which affect an organism after conception and are external to it.

General intelligence. The sum of one's capacities to learn, or to benefit by, experience.

Mental age. Mental age, indicated by M.A., may be said to be one's capacity age. It is the same as the chronological age for the majority of persons. If a person is "bright" for his age his M.A. exceeds his chronological age; if a person is "slow" for his age his M.A. is less than his chronological age.

Intelligence quotient. The intelligence quotient or I.Q. indicates the probable rate at which one is able to learn. It is found by dividing the mental age by the chronological age.

Accomplishment quotient. The accomplishment quotient or A.Q. indicates whether or not one is doing as well, better, or not as well as he should in terms of his mental ability.

QUESTIONS AND EXERCISES

1. List all the differences you can between you and someone whom you know quite well but who is different from you in many respects. Using the following key, try to account for the differences which you listed: due (1) almost entirely to heredity, (2) largely to heredity, (3) equally to heredity and environment, (4) largely to environment, (5) almost entirely to environment.

2. Under what headings might the various differences among individuals be grouped? Are the differences thus grouped due to heredity primarily? To environment? To both?

3. Discuss the early attempts to measure intelligence.

4. What does it mean to say that a child has a mental age of 6 years? Suppose that the mental ages of three persons all of whom are 10 years of age chronologically are 7, 10, and 13 years. What else do you know about these persons?

5. What is meant by the intelligence quotient? How is it computed? What can you say of a child who has an I.Q. of 100? Of 80? Of 130?

6. Classify the following whose I.Q.'s are 100, 125, 45, 70, 90, 135, 20.

7. Discuss the results of the Army testing program. What arguments arose as a result?

8. Discuss recent investigations concerning the "constancy of the I.Q."

9. What kinds of intelligence tests are there? What are the advantages of the various types?

10. Discuss the A.Q. What can you tell about a child whose A.Q. is 100? 120? 90? Why should the teacher be interested in the A.Q.'s of her pupils?

11. What provisions do school systems make for individual differences among pupils? How can a teacher provide for differences within her own class?

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CHAPTER XV

THE EFFICIENCY OF BEHAVIOR

In Chapter XIII it was pointed out that learning curves reveal plateaus due to various causes, one of which is fatigue. There have been many investigations concerning the nature of fatigue and concerning the effects of drugs, varying amounts of sleep, different types of incentives, variations in temperature, and other factors on physical and mental efficiency. The results of these experiments are sometimes conflicting, largely because they have not been continued over a sufficiently long period of time. There are, however, some points upon which there is rather general agreement, and it is the purpose of this chapter to discuss these in detail.

The nature of fatigue. Fatigue is frequently defined as that condition which decreases the capacity for work. This definition implies that fatigue may be measured by determining the decrease in output of work or by measuring the increased amount of time required to do work of equal amount and accuracy under fatigued conditions. This definition is unsatisfactory as is also the measurement of fatigue by either of the two methods mentioned. Incapacity for work and decrease in output may be due to many factors. If all factors except fatigue can be kept constant the results may be of some significance, but it is as yet practically impossible to keep the feeling or emotional factors constant over any considerable period of time.

True fatigue is physiological. It is due to poisons resulting from work which are not eliminated as rapidly as they are formed. These poisons, however, may be eliminated during rest.

It is better to define fatigue as that condition which makes one less able to work with one's normal speed and accuracy *because of work that has been done.* Such fatigue is removable by rest. So-called feelings of fatigue are often a very poor indication of actual fatigue. We say we are tired from having done a piece of work when, as a matter of fact, we are more likely tired because *of* this type of work in the sense that we are " sick of it " and want a change. Fatigue of this type which is properly not fatigue at all but *ennui,* will be discussed in a later section. True fatigue is a safety device, in that it warns the individual against exhaustion.

Physical and mental fatigue. Physical fatigue is well known to everyone. As one repeatedly opens and closes the hand it takes longer and longer to perform this operation, and if persisted in there comes a time when it can be done no longer without a period of rest. This is largely muscular fatigue, and the inability of the organism to continue the operation is due to poisonous substances which have collected because of having done the work and which the organism has been unable to eliminate. Sometimes, however, what seems to be physical fatigue may be only *ennui.* For example, we hear this statement, " I can't walk another step," when the speaker may be good for another half mile. " I do not choose to walk another step " would be nearer the truth.

Mental fatigue is much less well understood than physical fatigue. In fact, some authorities hold that mental and physical fatigue are one and the same — that all mental fatigue is due to the exhaustion of the muscles which are concerned with the mental work that is being done. A person reads until he complains of fatigue which he believes is the result of reading. Reading is a mental function, therefore the fatigue is regarded as mental fatigue. Much if not all such fatigue, however, is due to the fatigue of eye muscles, and of muscles involved in holding the head up, in holding the book up if one does not rest it on a table, and in maintaining the bodily position. Such fatigue is the result of muscular strain rather than of the mental processes involved in reading. When the term " mental fatigue " is used it refers to fatigue resulting from mental work, while the term physical fatigue is reserved for fatigue resulting from physical work. Of one thing we are certain, and that is that physical work results in fatigue much sooner than does mental work.

Two points of view. Psychologists are divided into two camps on the subject of mental fatigue. One group holds that there is no such thing as mental fatigue; that it does not exist; that neurones do not tire simply because they cannot do so. The other group maintains that mental fatigue does exist, but that the neurones do not fatigue so readily as do the muscles. The former view was suggested after investigations revealed no recognizable fatigue and no decrease in the output after strenuous and long-continued mental work. It must be remembered, however, that these investigations for the most part concerned per-

sons of superior mental ability who may have had unusually high resistance to fatigue. It is also possible that fatigue may have been present but that it was not measurable since by putting forth more effort and probably using up more energy there was no observable decrease in the product.

So far as the teacher is concerned with fatigue it is true that the ordinary mental work of the school day need not fatigue the pupils. If they seem to be fatigued by a piece of work it is well to see whether they are not "tired of" it instead. Comparatively few persons engage in mental work to the point where actual mental fatigue sets in. Before this point is reached the person has probably quit either because of disinterest or because of physical fatigue due to muscular strain.

Age and sex as factors in fatigue. It seems hardly necessary to mention the fact that young children fatigue more readily than older children although the reverse seems to be true when we watch the almost constant physical activity of little children, which would tire many an adult. Certainly little children are much less resistant to mental fatigue and are much less efficient in mental work than older children, probably in part because they have not learned to apply themselves to the work to be done. They have not learned to control their immediate interests in favor of more remote ends, and they have not established good methods of work.

Teachers should bear in mind that since young children fatigue more readily than older children they need more frequent rest periods and shorter work periods. Young children should have frequent change of work.

Not much is known about sex as a factor in fatigue. Investigations reveal the fact that, in general, boys are more resistant to physical fatigue than girls. Insofar as mental fatigue is in part physical, it seems probable that girls would tire mentally more quickly than boys. It may be that they are more persistent and that perhaps at the expense of a greater expenditure of energy they may be as mentally efficient as boys — perhaps more so in terms of output. This field needs further investigation before valid statements can be made.

Individual differences and fatigue. It will be recalled that in the chapter on individual differences the statement was made that individuals vary in every measurable trait. Certainly they vary in the degree to which they seem able to resist fatigue. Children of the same age, as well as children of the same family not far apart in respect to age, show this difference markedly. Probably differences among individuals with regard to fatigue are due in large measure to their physical condition.

Health, a factor in resisting fatigue. Everyone knows how easily he is fatigued when convalescing from an illness. Almost any exertion seems to tire one at this time. One's resistance to fatigue is greatest when one is enjoying perfect health, and it decreases proportionately as the health is impaired. In fact fatigue is an important symptom of many diseases. The correlation between sound health and resistance to fatigue is probably very high.

Lighting, a factor in fatigue. There is no doubt that lighting is a potent factor in fatigue. Lighting

rooms by several lamps in various parts of the room is undesirable from the point of view of freedom from fatigue. The arrangement whereby rooms are lighted from the ceiling is a much better method. Experiment has proved that everything within the range of vision should be lighted as uniformly as possible. Indirect lighting of moderate intensity is best for a minimum of fatigue. Shadows make for fatigue because the eyes have to adjust themselves to them. When the eyes have to adjust themselves to the most brilliantly lighted parts of the room where there is likely to be a glare, to parts that are nearly obscured in shadow, as well as to the intermediate stages between these extremes, fatigue is likely to result.

Relation of work to be done to fatigue. Type of work done is also responsible for differences in susceptibility to fatigue in the same individual. On the whole work with which one is familiar is less fatiguing than new work. One is more likely to become bored by the familiar task, especially if it is looked upon as drudgery, but again it must be remembered to be tired *of* it does not mean to be tired *by* it. New work is likely to be more interesting, hence one puts forth greater effort and may continue to work although the presence of fatigue may be indicated if accurate measurements are made. Apart from incentives or any emotional factors, then, work which has become more or less habitual is less fatiguing than work to which one has not yet become adjusted.

Recovery from fatigue. Since both physical and mental fatigue are actualities, how is one to recover from their ill effects? There are three common cures

for fatigue — sleep, rest or relaxation, and change of work. Sleep is undoubtedly the best means of recovering from the effects of fatigue. Individuals differ with respect to the amount of sleep which they seem to require or to which they have accustomed themselves. Children require more sleep than adults, and those in impaired health require more than healthy persons. Sleep is deepest during the first hour or two as evidenced by the strength of stimulus required to awaken a person who has been sleeping but a short time. Whether or not body repair, which goes on during sleep, is greatest during the period of deepest sleep is not known.

Relaxation is probably the second best means of recovering from fatigue. Frequent short rest periods rather than infrequent longer periods make for efficiency, both physical and mental. Often the rate and accuracy of output after rest are greater than before it. Little children need more frequent rest periods than older children. The same holds true of persons in poor health, especially those who are suffering from nervous disorders or malnutrition.

The belief that a change of work is one means of recovering from fatigue is sometimes but not always true. If one is tired *of* the work, bored by it, rather than being actually fatigued by it, change of work is often effective in reviving interest. If, however, one is fatigued as a result of the work and hopes to recover from the effects of fatigue through a change of work, let him be very sure that the second work is easier than the first. In any case, if true fatigue has set in, sleep or rest is preferable to work of any kind.

It has been believed by some that when mentally fatigued one should engage in some form of physical activity preferably of a recreational type. This notion is not based upon facts, however. When fatigued either mentally or physically the absence of activity either mental or physical is best, and this inactivity is best attained by either fairly complete relaxation or actual sleep.

The effect of disinterest upon efficiency. As has already been said, lack of interest is often mistaken for fatigue. Probably no other one factor is so often the cause of inefficiency as lack of interest. A person rarely puts his best into an activity in which he has no interest either immediate or derived. Teachers, then, should strive to secure the interest of their pupils in the work to be done if they wish the work to be done efficiently and if they wish to train their pupils to become efficient workers. It is one thing to say, " Secure the interest " of the pupils, and quite another to do this. For the most part the work must either call out or give expression to innate tendencies or else it must be associated with work in which the pupils have already developed an interest. Other things equal, the greater the interest, the greater the efficiency.

It should be emphasized, however, that " interest " is a mental trait and may often be directed or controlled by the individual himself. It is far better to be the master of one's interests than to be their slave. The ability to put one's self vigorously into the work that one must do is undoubtedly essential to the highest ranges of achievement — and this ability is one that many people can acquire if they make the effort.

Incentives and efficiency. Investigations have proved that output can be greatly increased through the use

of proper incentives. For example, H. C. Kitson experimented with compositors of ten years' experience on the average, and found that in a five months' period the output increased 67% due to the use of such incentives as bonuses, commissions, prizes, praise, and the like. When these incentives were later removed, the output decreased although it did not decrease to the point where it stood before the incentives were first used, probably because during the five months' period the compositors improved their habits of working. When the worker is motivated, then, he is likely to be more efficient. This opens up a very important and grave question for the teacher. Some students of education assert that "prizes, diplomas, and degrees are necessary evils." It is indeed a strange evil that makes for efficiency. However, we do not wish our pupils to do well merely to win prizes, but because "work that is worth doing (if it is worth doing) is worth doing well." The probability is that, if children become accustomed to doing efficient work through the use of material incentives, they will later continue to work efficiently because of habits they have formed, although not so efficiently as when the incentive operated. It is probably better with children to use such incentives as an appeal to pride, giving responsibility, approval, promotion, and the like rather than to emphasize material incentives; and the ultimate goal should be the development of a dynamic ideal of "good workmanship" — the ideal of doing as well as one can every task that one has to do irrespective of material or immaterial rewards.

Knowledge of progress and efficiency. It is impor-

tant that workers be told whether they are efficient or inefficient. In a recent experiment with women college students it was found that for the most part improvement resulted whether the remarks were complimentary or disparaging, whereas no measurable improvement was made when there was no comment concerning the output. In Kitson's experiment, to which reference was made in the previous section, it was found that the mere display of the achievements at the end of the work period was a potent urge to improve.

This factor is of especial interest to teachers. No teacher should require a class to submit work which he does not intend to inspect and later comment on. Rivalry, too, is an instinctive tendency, and that type of rivalry which is best is rivalry with one's self. It is an excellent idea for pupils to keep individual graphs indicating their progress. Those who are likely to become discouraged because they are not the class leaders gain confidence in themselves by means of this device.

Caffeine and efficiency. Many experiments have been made to determine the effects of coffee and other caffeine-bearing substances upon efficiency. It has been found that caffeine has a stimulating effect resulting in increased speed of movement which makes for greater physical efficiency and also increases mental efficiency for from one to four hours after taking. Contrary to current opinion no subsequent period of depression is noted, at least not during a seventy-two-hour period. The increase in efficiency was slight, however, and the worth of it may be offset by the pos-

sible physiological effects which result from the use of caffeine. The experiments have not been carried on over a sufficiently long period of time to determine what the physiological results are. In some experiments it was found that the same increase in efficiency resulted when the students were given coffee from which the caffeine had been removed as when they were given coffee containing caffeine, showing the effect of suggestion. Perhaps coffee stimulates because we expect it to do so, at least in some instances. All of the experiments referred to have been performed upon adults. A recent investigation seems to indicate that with children coffee may hinder mental ability. However, other factors, such as home conditions, may have been responsible in part at least for the lowering of capacity which was noted.

Smoking and efficiency. The effects of tobacco upon both mental and physical efficiency are unfavorable according to investigations in this field. The decrease in efficiency in each instance is small, although tobacco has a slightly greater effect upon physical than upon mental efficiency. It is possible, however, that the use of tobacco, as was noted in the use of caffeine, may produce physiological ill effects. Also, the effects of the prolonged use of tobacco or its excessive use may result in a greater loss in efficiency. Further investigation needs to be made before we can say very much with regard to the effect of tobacco upon either physical or mental efficiency.

The effects of alcohol upon efficiency. A number of experiments have been performed to ascertain the effects of alcohol upon various functions. It has been

found that alcohol has a depressing influence in that it decreases efficiency in every function studied, whether physical or mental. Whereas the depressing effects of tobacco are slight, the effects of alcohol are pronounced. Of course the experiments which have been carried on have used adults for subjects.

Time of day and efficiency. It has been the opinion of most persons until recently that children are most efficient during the early morning hours, hence the practice of putting arithmetic, which has long been considered the "hardest" subject, first on the day's program. The notion probably came about because when the children came to school in the morning they had not been long out of bed and were probably not fatigued by work of any kind. As a matter of fact, it has been found that most children reach their maximum of mental efficiency between ten-thirty and eleven-thirty, whereas they reach their greatest motor or physical efficiency at about three o'clock in the afternoon. An interesting variation is found among children of the poorer classes, who reach their maximal mental efficiency about an hour earlier than that already mentioned. This is probably due to the fact that they rise earlier and have a less nutritious and earlier breakfast, hence the digestive processes are completed earlier, and by the time the other children are attaining their greatest efficiency, these children are getting hungry.

The difference in efficiency during the school day is not of great significance. One time is nearly as good as another for the various school tasks. Probably the period of lowest efficiency is the first hour after the midday meal, due to the digestive processes going on.

It is therefore advisable to have work which requires the least concentration at this time. It is estimated that efficiency decreases perhaps from ten to fifteen per cent during the school day.

Effects of temperature, humidity, and climate upon efficiency. The report of the New York State Ventilation Commission was surprising to most persons interested in the effect of temperature and humidity on efficiency. According to this report, which was the result of careful and extensive investigation, " when an individual is urged to do his best, he does as much and does it as well, and improves as rapidly, when air is hot, humid, stale, and stagnant as under optimum ventilation conditions." Such conditions as a temperature of 86° F with 80% humidity, no fresh air, and no air movement would be considered as bad. May not these unfavorable conditions be classed as distractions? Investigations have revealed the fact that persons frequently are more efficient when they overcome distractions than if there were no distractions to overcome. How is this explained? Largely by the fact that there is being expended an increased amount of energy. Even taking into consideration the report of the Commission, can it be said that " hot, humid, stale, and stagnant air " are of no consequence in mental efficiency? Probably not, for if an individual is achieving as much because " urged to do his best " his achievement may be at the expense of an unwarrantable expenditure of energy which over an extended period of time would no doubt prove harmful to the organism. Insofar as climatic conditions are concerned, it is well established that temperate climates make possible

greater efficiency both mental and physical than do either the extremely cold or extremely hot climates.

How to increase efficiency. Efficiency, both mental and physical, can be increased oftentimes merely by removing common causes of inefficiency. One of these is physical lassitude. Keeping in good physical condition, eating the right kinds of food, and securing a sufficient amount of rest are important factors in maintaining efficiency. The output of a run-down machine is rarely of a high quality.

Another cause of inefficiency is distraction. If one would be " one-hundred-per-cent " efficient, one should remove serious distractions insofar as possible. It is true that sometimes one works better and faster while trying to overcome distractions, but this is probably at the expense of a greater expenditure of energy, and it is extremely doubtful that the increase in accuracy and speed is long sustained.

Another very effective method whereby efficiency may be increased is to improve one's methods of work. Analysis of the job to be done often results in the elimination of many useless motions and useless steps in mental procedure with the result of an appreciable increase in output. Appropriate applications of the principles of economy in learning (Ch. XII) play a very important part in increasing one's efficiency. Finally, it will be remembered that emotion kills definite thought and action. If one would be efficient one should not give way to excitement, worry, vexation, fear, and the like.

Summary. Fatigue is that condition which makes one less able to work either so rapidly or so accurately

because of the work that has been done. There are two kinds of fatigue, mental and physical. We know little about the former kind. Young children fatigue more readily than older children and girls are somewhat less resistant to physical fatigue than are boys. Healthy persons are much more resistant to fatigue than persons in poor health. In order to prevent fatigue due to poor lighting, have the entire field of vision lighted by an indirect system of moderate intensity. Other things being equal, the more habitual the work the less fatiguing it is. When suffering from fatigue one should seek recovery through sleep, relaxation, or a change of work. The first cure is preferable. If the work is changed, the second task should be easier than that which caused the fatigue.

One is likely to be more efficient if interested in one's task than if one is disinterested. Incentives and a knowledge of one's progress, also, make for greater efficiency. Caffeine seems to increase efficiency somewhat while tobacco and alcohol decrease it, the latter profoundly. Time of day, temperature, and humidity seem to have little effect upon efficiency, but temperate climates are much more favorable to efficient work than either extreme. If one would achieve one's maximal efficiency, keep well, avoid serious distractions, improve the methods of work, and avoid turbulent emotional states.

QUESTIONS AND EXERCISES

1. What is fatigue? Why are feelings of fatigue often unreliable indicators of fatigue? Distinguish between physical and mental fatigue. Illustrate. Discuss the two points of view relative to mental fatigue.

2. Discuss the relations of the following factors to fatigue: age; sex; health; lighting; type of work.

3. What means are there whereby one may recover from the effects of fatigue? Discuss the relative values of each. Why is it not true that physical recreation is a good cure for mental fatigue?

4. Discuss the influences of incentives on efficiency. Of disinterest. Of knowledge of one's progress.

5. What are the effects of caffeine upon efficiency? Of tobacco? Of alcohol?

6. Discuss the relation of the following factors upon efficiency: time of day; temperature; humidity; climate.

7. How can efficiency be increased? Explain each suggestion and illustrate.

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CHAPTER XVI

CHARACTER AND BEHAVIOR

There is a growing tendency among psychologists to distinguish rather sharply between " intellectual " traits and " personality " traits. The former may be thought of as the abilities that are measured by the intelligence tests (Ch. XIV) ; the latter in a broad sense include the abilities or tendencies that are not measured by the intelligence tests, but which seem no less important in determining behavior. A specific group of personality traits — those that are associated with what we term " moral " conduct — will be considered in the present chapter as " character " traits. They include the traits that popular speech has long recognized under such terms as honesty, reliability, temperance, tolerance, loyalty, conjugal fidelity, cleanliness, industry, and the like.

What is meant by " moral " character. When it is said that one has a " good moral character " the usual implication is that one acts consistently with the generally accepted standards of moral conduct. Most of these standards have been recognized for ages. Among civilized peoples they are the most important of the social or group *mores* (p. 73). They are the criteria by which one's behavior is judged by one's fellows. To act inconsistently with them is to risk social disapproval, scorn, even condemnation and punishment.

At all times and among all peoples there have been those who have rebelled against these standards — who have sought to free themselves from what they call the " conventional " life, which really means the life that is in harmony with the *mores* or standards of one's group. Others, if not openly rebellious, are held in leash chiefly by fear of social condemnation and would not hesitate to act in unconventional ways if they were sure that detection and disgrace would not follow. Still others undoubtedly take the *mores* — the prevailing moral standards — for granted. Only on rare occasions do they feel the temptation to jump over the traces, and on these occasions the temptation is likely to be thrust quickly out of mind. Finally, there are those who understand the significance of the moral constants, who idealize the virtues, and who in the face even of strong temptation choose voluntarily to do " right " instead of " wrong."

There is no known way to determine how many people belong in each of these groups, but the general suspicion is that the group last named is not large, and that an important task of character education is to increase its numbers.

The justification of the moral constants. The standards just referred to are fundamentally social standards. They owe their power and their persistence to the fact that, in the long course of social evolution, they have been found essential to the safety, perpetuation, and progress of social life. This is especially true of what may be called the moral constants. These are usually stated in the negative form — in a series of " Thou shalt not's." In a way this formulation is

psychologically sound, for the negative response of *not* yielding to impulses or desires is easier to establish and generalize than the response of positive and aggressive action directed toward remote ends or dictated by ideals. (Recall the discussion of attention, Chapter IV.) Quite obviously, however, the emphasis should be placed wherever possible on the positive side. It will be generally agreed that the type of character most needed in the social life is that which impels one to do good to one's fellows rather than merely to refrain from doing evil.

The use of the term "constants" to designate the basic moral standards should not be interpreted to mean that such standards never change, but rather that the changes are likely to be infrequent, occurring only when changed conditions of social life render old standards inadequate or perhaps even harmful. It is sometimes said that the present age is one of profound changes and that some of these changes will necessarily lead to a transformation of the fundamental *mores*. It is difficult to imagine any social changes that will invalidate such standards as respect for human life, respect for womanhood and motherhood, respect for the rights of childhood including the right to a legitimate birth and a normal upbringing in a normal home, respect for such human prerogatives as the right to be free from the perils of false witness, libel, and slander. These, at least, may be looked upon as moral constants in the strict sense of the term. As long as society rests upon its present economic basis, too, large importance must attach to individual foresight and thrift, to the end that neither the individual nor those normally dependent upon him may become through his neglect a burden upon society. Checking this, however, is another standard, not as yet well defined, which may be worked into the *mores* of the future: namely, a distinct recognition of the evils that vast material wealth in the hands of a few individuals may involve. Luxury and display beyond the means of the majority may easily cause unnecessary envy and bitterness; hence the accumulation of wealth

has already led to certain restrictions in property rights, notably in the form of income and inheritance taxes. Equally likely of modification in the future are the rights of nations and the corresponding duties of their component individuals. A striking example of the "specificity" of the moral constants (that is, the failure to make them universal standards) has been not only suspension of the interdiction against killing and maiming and seizing property in time of war, but the imposition of these very acts as duties upon the individual. The clear indication to-day is that nations as well as individuals must recognize the moral law, — nations as well as individuals will be judged by their "character traits."

The problem of developing desirable character traits. We have been dealing so far in this chapter chiefly with the standards that our civilization employs in judging the character of individuals. The detailed consideration of the worth or validity of these standards is the province not of psychology but rather of ethics and of sociology. What concerns psychology — especially educational psychology — is how best to make desirable standards dynamic forces in controlling behavior. Here we are confronted with what is perhaps both the most difficult and the most important task of education.

Unfortunately it is only a dim light that psychology as a science can throw as yet upon this task. The problem is complicated by many factors that have not as yet been isolated for study, much less related in a helpful way to the problem as a whole. As we have seen, there are fairly definite and fairly well understood principles which govern the formation of habits and skills (Ch. VII). There are other principles, less definite but still helpful, which can be applied to the development of concepts and meanings (Ch. XII). Both ability

to learn (intelligence) and the outcomes of learning (achievement) are susceptible to fairly reliable measurement (Chs. XIII and XIV). But the subtle forces that are summed up under the term character are still a puzzling challenge both to the psychologist's understanding and to his measuring instruments. In a rough way, he can tell us how much intelligence a given individual possesses; but even in a rough way, except in one very narrow range of traits, he cannot tell us how much character one possesses.

While what we actually *know* in this field is narrowly limited, however, there is no end of opinions, speculations, and theories. Very recently, too, tests for a few very specific character traits have been devised and applied, and some interesting hypotheses may be drawn from these pioneer attempts to study character in a quite objective and impersonal way. The remainder of this chapter will be devoted to (1) certain theoretical inferences regarding character traits that seem to be justified by the general principles and postulates set forth in our earlier chapters, and (2) a brief summary of the objective studies and the suggestions that may be provisionally drawn from their findings.

Levels of conduct. A helpful classification of types of moral conduct has been suggested by McDougall. He recognizes three levels of such conduct. The lowest level is represented by the person who chooses the right because of fear of punishment if he should choose the wrong or because of the hope of some reward if he avoids the wrong. Prizes, privileges, and honors are examples of rewards; pain or in general unpleasant experiences of a clear-cut, individual sort ("spankings," being sent

supperless to bed, having toys taken away) are types of penalties or punishments. Through the discipline of such consequences, in all probability, the first steps in moral growth are usually taken.

A second level of conduct is reached when one responds to praise and blame. Conduct determined by these motives is deemed to be a little higher than conduct on the first level because a social rather than a purely individual motive is involved. It would probably be agreed, too, that one who responds to the censure or approval of the group rather than merely to the censure or approval of this or that individual has advanced still another step on the second level.

The third level is reached when one's choices are determined, in part at least, on the plane of ideals — when the desire to live consistently with one's ideals is the dominant motive. The paramount importance to society of advancing as many individuals as possible to this third level will be clear enough upon a little reflection. As we have seen, right conduct may be determined by the hope of individual reward or the fear of individual punishment, by the hope of the approval of others or by the fear of their disapproval. But suppose that one is very certain that wrong conduct will not be detected, that one will be neither punished nor censured for the act which one knows to be wrong but which one very keenly desires to do. Or suppose further that social approval actually rewards one who does wrong (as in the case of the " gang " that makes a hero out of its most criminal member). Under such conditions, of course, the motives which, on the two lower levels, would normally operate to promote

rightdoing actually operate to promote wrongdoing. Only the individual who has advanced to the third level — who has learned to control his conduct by ideals — can be trusted to pass through the greatest moral crises in safety. Sometimes even ideals fail in these crises, but they are the best guarantees of right conduct that are known, and the clear duty of education is to do everything in its power toward their development.

The nature of ideals. We may get a little firmer grasp of the problem by an attempt to clarify the meaning of the term "ideals." As the term is used in this chapter, an ideal may be regarded as an idea, a meaning, or a concept (see pp. 217 ff.) to which a feeling of worth or value has been attached. We may put this in another way by saying that an ideal is a master idea, peculiarly directive over conduct because of its emotional coloring.

It is helpful to recognize two large groups of ideals. One group we shall call *terminal* ideals; the other, *regulative* ideals. The former are relatively remote aims or ends of conduct and are usually spoken of as ambitions or large life purposes. One person, for example, makes the amassing of wealth his ideal; another visualizes himself as a powerful political leader; still another aims to become a great scientist. Terminal ideals are of very great importance in the life of the individual, but aside from encouraging worthy ambitions in young people, education is not so much concerned with ideals of this type as with regulative ideals. The latter are typically represented by the standards or moral constants that we have already referred to.

The significance of regulative ideals lies in the fact that they are needed to hold conduct within certain limits as one strives to realize one's terminal ideals. In amassing wealth or in seeking to become a force in political life, for example, one is almost certain to be tempted to act unfairly and perhaps even dishonestly; as has been suggested, only vigorous ideals of fair play and honesty will insure right conduct under the stress of temptation with the added conviction that one will not be "caught" in wrongdoing.

The development of ideals. The fact that ideals are like ideas or concepts in that they have a core of meaning suggests that an important phase of the development of ideals is to build up the meanings that should go with them. We have already found (p. 216) that meanings come ultimately from actual adjustments to actual situations; hence it would be most reasonable to infer that efforts to develop worthy ideals should first of all make sure that the meaning-elements either have an actual conduct-basis or are of such a character that the learner can work them back imaginatively until they rest upon such a basis. Before one can develop a dynamic ideal of honesty, for example, one must have distinguished clearly between acts that are honest and acts that are dishonest.

It is clear, too, that if ideals are to be general in their application, practice must be given in applying them to different situations; in other words, the meaning of honesty must quite deliberately be extended to cover all of the types of situations to which we would have it applied. It is safe to say that most people are extremely specific in their thinking; they do not readily expand or generalize the meanings that they use; if education wishes to have meanings expanded

or generalized it must take explicit and deliberate steps toward this end.

Marked inconsistencies in conduct testify to the very specific character of regulative ideals in many if not most people. These inconsistencies are often apparent to everyone except the individual himself. A person who would resent the suggestion that he is at all dishonest may yet take an unfair advantage in a business transaction — perhaps keeping from a prospective purchaser the actual facts regarding the goods that he wishes to sell. A man may pride himself on his charity as expressed in the size of his contribution to the Community Chest and yet both underpay and overwork his employees. Some persons who are loud in demanding that their own opinions and practices be tolerated are themselves far from open-minded when it comes to tolerating the opinions or practices of others; the "intolerance of the radical" is a familiar phenomenon. Very often these inconsistencies are due to the fact that one does not recognize the conduct in which he indulges as coming under the head of wrongdoing. The meaning "wrong" does not attach to it, and the adjustment of avoidance or withdrawal which normally goes with the meaning "wrong" is consequently not forthcoming.

If we are to follow the implications of the principles discussed in our earlier chapters, we must conclude, also, that definite steps should be taken to demonstrate to the learner the worth or value of the standards that we would have idealized. What is sometimes termed moral instruction is often futile and sometimes negative in its effects because it is given by the wrong persons. Some people really ought never to try to preach virtues to others, for in the minds of others the virtues are associated with a colorless or unpleasant personality and become for that reason distasteful. This does not mean that "preaching" has no influence whatsoever on character traits — a conclusion that some students

of the problem seem to have reached. It means rather that the efficacy of preaching may very easily be negated by a disagreeable personality on the part of one who essays it — as well as by other factors, as we shall see later.

The relation of habits to ideals. It is incontestable that the habits formed in early life have a powerful effect upon what we call character, and it is altogether likely that this effect is due in part to the fact that the specific habits of truthfulness, cleanliness, and regard for the rights and feelings of others, all of which a good home is likely to insist upon long before the child understands the meaning of these virtues, form a very effective concrete basis upon which the ideals can later be built. Good habits are important to a good character, but it should be insisted that character is more than one's capital of habits. As we have suggested, the test of character is what one does under temptation, and the very word "temptation" means that one is facing a situation which demands a conscious and not a mechanical response. It is in these situations that dynamic ideals — master ideas — are indispensable, but these ideals must have a concrete conduct-basis if they are to be anything more than glittering generalities.

Character as related to the instinctive urges. From the discussion of instinctive tendencies (Ch. VII), we may gain some important suggestions regarding character traits and their development. Many types of forbidden conduct are perfectly "natural." Nature, indeed, has actually loaded the dice in the direction of desire. To appropriate what pleases one is not

" against nature " — on the contrary, it is precisely what the natural, untamed human animal would do. It is civilized society that has developed the institution of property; it is in response to a need of social life that theft has been recognized as wrong. The lower animals, like children and adults with children's minds, are neither moral nor immoral; they are unmoral. In many ways moral conduct in the race has been a conquest over the forces of nature; the achievement of real character by the individual, it may be assumed, will involve a similar conquest.

It has been repeatedly pointed out in preceding chapters that human beings vary in all traits. This is true of the instinctive urges. While all normal persons feel these urges, all persons do not feel them in the same degree. There is consequently a difference in the appeal that tempting situations make to different individuals. The normal person visiting a jeweler's shop may desire to possess the necklace that a careless clerk has left within easy reach, but the desire of possession is not strong enough to break down the inhibiting ideal of honesty. In a few people, however, the desire of possession is so strong as to override all inhibiting forces.

Cases of the latter sort are distinctly pathological and they illustrate one end of the curve of distribution for this particular trait. These extremes must always be reckoned with and constitute very serious problems. Fortunately the tendency to-day is toward the segregated and specialized treatment of these extreme " behavior-problem " cases. Both home and school, however, must recognize the presence of instinc-

tive urges in all normal individuals, and the need of developing the ideals and standards that will hold these urges within bounds. The process described in Chapter VII as the "sublimation" of instinctive tendencies is of prime importance in this connection.

The vogue of a group of psychologists known as the Freudian school has led on the part of many to a real fear of the repression or inhibition of instinctive urges. It is true that repression or inhibition in some cases leads to pathological results. Freudian psychology grew out of the study of mental ailments, and quite naturally the pathological cases — the extreme deviates from the norm — have loomed large in its investigations. What determines conduct in these deviates has been assumed to operate with the same force in all individuals. An abandonment of inhibition or repression, however, would simply mean the end of civilization. The institutions of civilized society have developed in part on the basis of "Thou shalt not." From the standpoint of the individual the best solution of the problem probably lies in a conscious effort to redirect into socially allowable (or even better, socially-profitable) channels the energy that the primitive urges release. One's desire for possession, for example, may not be gratified by a simple act of appropriation, but there is no interdiction against working steadfastly and saving carefully to the end that one may possess by legitimate means. A citizen may resent inconsiderate treatment at the hands of public employees but he would court trouble were he to express this resentment in the "natural" way by wreaking bodily vengeance on the offending agent; there is, however, a real need for well-tempered but none the less determined efforts toward making courtesy and consideration for the public a dynamic tradition in all branches of the public service. And it is possible, as was pointed out in the discussion of instinctive tendencies, to sublimate even the most fundamental and imperious of the primitive urges — to direct their energies toward objects and causes quite different from those to which they "naturally" attach and through patterns of behavior quite different from those that made up the "natural" responses.

Discipline as a factor in the building of character. In educational discussions to-day the word "discipline" is in disfavor — in large part because it has become associated with unintelligent and sometimes brutal efforts to mould conduct into forms desired by those administering the discipline. The word carries with it, however, elements of strength and virility which are so thoroughly consistent with the seriousness of character building that it would be unfortunate to abandon the term, and in as much as no equally forceful word has been proposed as a substitute, we suggest that it be retained as designating a most important phase of the educative process.

Discipline implies control and guidance: either (1) control of children by parents or teachers or by others to whom the responsibilities for control and guidance have been delegated, or (2) control of the individual by himself through the agency of self-discipline. The words "control" and "guidance" imply the conscious direction of conduct toward certain definite ends even in the face of other urges or distractions. In the work of education these ends are commonly the formation of specific habits or the mastery of meanings. The implication of the term discipline is that effective mastery requires a certain measure of persistent and systematic effort on the part of the learner which must either be imposed by the teacher or voluntarily assumed by the learner himself. Both specific habits and meanings, as we have found, are involved in the development of character traits; consequently, if our reasoning has been valid, it would seem that the concept of discipline with its implica-

tions of persistent and systematic training must be accorded an important place in character education.

The significance of discipline in this connection may be well illustrated by the influence of a good home. In such a home, children are from very early life trained in the habits and meanings that form both a specific expression of some of the basic moral standards and a concrete basis for the later generalization of these habits into dynamic ideals. On the side of habits, for example, they make more or less automatic the responses that are basic to decent and healthful living: washing hands and face before eating; brushing the teeth after eating; avoiding indecencies of varied but very specific sorts; eating and sleeping at regular hours; giving precedence to women and to older persons; speaking courteously; keeping quiet when others are speaking; respecting the property of others; respecting the rights and feelings of others. On the side of meanings, they are associating undesirable acts with the term "wrong" or "bad" and desirable acts with the term "right" or "good"; they are building a concrete conduct basis for such fundamental words as truth, deceit, honor, shame, love, obedience, generosity, stinginess, kindness, cruelty, courage, cowardice. And because the discipline of a good home, while firm and persistent, is also intelligent and sympathetic, the appropriate feeling values are continually being woven into these meanings and associated with the conduct patterns that lie back of them.

In a good school the processes of character building started in the good home may well be continued. The specific habits may be augmented to include regularity

and punctuality in doing one's work and in meeting one's engagements, and many specific acts and inhibitions that are essential when one works in relatively large groups. The meanings may be still further expanded and generalized (p. 211). And if the discipline of the school is both intelligent and sympathetic, it is altogether likely that here, too, the appropriate feeling values will transform meanings into ideals of a dynamic and worthy sort.

An important point at issue in present-day educational theory involves this conception of discipline. One group or school of theorists, usually termed the Progressives, tends rather strongly to discount the importance of systematic training, especially when imposed upon the learner from without. It would have the mastery of habits, skills, and meanings await a recognition by the learner of the value or purpose of these outcomes, and would consequently regard as unfortunate if not even perilous any effort toward coercion. In connection with the moral constants that we have been discussing, this school of educational thought would follow in the main Spencer's doctrine of "natural punishments" (pp. 111 ff.). In the development of ideals, it would emphasize the discovery by the learner himself of the worth or value of the standards that crystallize the *mores*. It points to the frequent failure of specific moral habits formed under the stress of externally imposed discipline to operate in situations other than those in which the habits have been formed — that is, the failure of the learner under these conditions to generalize the standards which the habits represent.

Educational theorists of the opposing school are often termed "Traditionalists" by the Progressives. Insofar as this term implies a reactionary attitude unsympathetic toward change, it is quite unjustified, for the Progressive doctrines under the same name and in practically their present form have been advocated at least since the middle of the seventeenth century and can consequently claim neither youth nor novelty. A much fairer designation for the opposing school would be to dub its advocates "Stalwarts." The

view of the Stalwarts contrasts with that of the Progressives by emphasizing the fundamental importance of systematic and persistent effort in all types of learning. While the Stalwarts would agree to the wisdom of enlisting the learner's interests and purposes wherever these were consistent with the ends sought in the learning activities, they would regard the proposal to let all learning wait on interest and purpose as a weak and defenseless policy, inconsistent with the needs of society and unjust to the learner himself. In the development of the moral constants especially they would urge the early employment of a sympathetic but firm discipline, externally imposed at the outset and whenever such imposition is needed to insure right conduct; but they would also recognize the capacity for self-discipline as a prime objective of all externally directed control. The fact that specific moral habits often fail of adequate generalization they would explain (1) by the apparent difficulty that everyone except those with very keen minds finds in unaided generalization of any sort, and (2) by the common failure of parents and teachers adequately to aid the generalizing processes in the learner.

The objective study of character traits. Interesting attempts to apply to character traits the measuring techniques developed in connection with intellectual traits (Chs. XIII and XIV) have been made during the past decade. What is recognized as the pioneer investigation in this field was reported by Paul F. Voelker [1] in 1921. This study aimed to answer the question, Can ideals be directly developed in such a way that they will be directive over conduct? In order to measure the influence of the instruction that was designed to develop such ideals, Voelker devised tests especially of honesty. The general plan of the tests was to confront the person with opportunities for cheating or other forms of dishonesty and then finding whether

[1] VOELKER, P. F.: *The Function of Ideals in Social Education.* Bureau of Publications, Teachers College, New York, 1921.

or not he took advantage of these opportunities. Thus one of Voelker's numerous " honesty " tests was to send a person to a store to purchase something for the sender, who also gave him a coin representing more than the price of the article, telling him to bring back the change. Prior arrangements were made with the merchant to give to the messenger slightly more change than he should have had. What the messenger did with this extra change became, therefore, a test of his honesty. Voelker's general conclusion from his experiments was that direct moral instruction of the type given in the Boy Scouts organization had a positive influence in promoting honesty.

By far the most extensive series of investigations so far published in this field are those reported in 1928 by Hugh Hartshorne and Mark A. May.[1] These, like the studies of Voelker, had to do with honesty or, speaking negatively, with the tendency to practice deception. They employed a technique essentially similar to that utilized by Voelker, but much more thoroughly worked out and refined. The investigations were confined chiefly to children between the ages of eight and sixteen enrolled in public and private elementary schools. Hartshorne and May give the following summary description of their procedure:

. . . "The general procedure has been to place the child in a situation in which deceit may be practiced and record his conduct. Three types of deceptive conduct have been tested: cheating, lying, and stealing. The situations in which deceit has been measured are: (1) certain classroom situations in which the pupils may or

[1] HARTSHORNE, H., and MAY, M. A.: *Studies in Deceit.* The Macmillan Company, 1928.

may not cheat on a test, examination, or class exercise, (2) certain situations in connection with athletic contests in which contestants may or may not cheat, (3) a situation involving school work done at home. Lying has been tested (1) by asking the child whether he did or did not cheat in some of the above tests, (2) by asking questions about those items of conduct which are generally approved but which are not often practiced. Stealing has been tested by placing the subject in a situation (1) in which there is an opportunity to take money and (2) in which there is an opportunity to take small articles."

Provisional inferences from the findings of objective studies. While the objective studies of character traits have so far touched only one small corner of a very large field it will not be amiss to formulate from their findings certain hypotheses which may serve as provisional guides pending further and more penetrating investigations. In doing this, emphasis will be laid upon those hypotheses that seem to be justified not only by the results of such studies as have just been described, but also by confirmatory evidence from investigations of other types and from theoretical inferences drawn from the more general principles set forth in earlier chapters and discussed further in the first part of this chapter.

The fundamental significance of early home training. Hartshorne and May found a very close correlation between home conditions and the presence or absence of honesty as a character trait in the children whom they tested. "Children who have better manners, who are better acquainted with art and music and the influences that indicate culture and refinement, and whose parents treat them decently are less deceptive than others who do not show these same refinements."

On the other hand deceit was found to be associated with "such factors as parental discord, parental example, bad discipline, unsocial attitude toward children . . ."

These findings are not only in full harmony with theoretical inferences from general principles but are also substantiated by the results of other types of studies. For example:

S. S. Visher reported in 1924 the results of an investigation which revealed, among other things, the occupational groups that furnish the largest proportions of men and women who achieve notable success in life. Taking inclusion in *Who's Who in America* as a criterion of success, he got from these "notables" statements concerning the occupations of their fathers and then he proportioned the number representing each occupation to the total number of persons engaged in that occupation according to the census of 1870 as typical of the decades during which the present-day leaders were a-borning. He found that the principal occupational groups of the United States have apparently contributed to the total number of present-day leaders in the following proportions:

Of every 37,500 unskilled laborers, one produced a child who later achieved distinguished success
Of every 1250 skilled laborers, one produced such a child
Of every 550 farmers, one produced such a child
Of every 62 business men, one produced such a child
Of every 27 professional men (all professions), one produced such a child; *but*
Of every 15 clergymen, one produced a child who attained a relative distinguished success in life

It would seem, then, that a child born into a clergyman's family around the year 1870 had nearly double the chances of success as did the children of the professional group as a whole; four times the chances that children of business men enjoyed; thirty-six times the chances of farmers' children; eighty times the chances of the children of skilled laborers; and twenty-five hundred times the chances of the children of unskilled laborers.

It is altogether probable that these wide variations are due in large part to inherited traits (see pp. 255 ff.); without doubt the professions have *selected* on the whole a larger proportion of men of native ability than have other occupations. But there is little reason for assuming that the clerical profession has selected twice the proportion of talented men as have law, medicine, engineering, and other professional callings. The striking advantage of clergyman's children over doctors', lawyers', and engineers' children must be due very largely to "nurture" rather than to "nature." (See pp. 262 ff.) Not only do clergymen as a rule have greater opportunities than most other men to give careful attention to their children's upbringing, but the social pressures that operate upon them (and upon their wives!) to take advantage of these opportunities are probably unparalleled in other occupational groups. Especially significant is the need for observing the moral constants, and perhaps of equal significance are the opportunities for generalizing into ideals the specific habits that these constants represent. (See pp. 301 ff.) Visher's findings afford a fairly effective vindication of the emphasis that we have laid upon the significance of a firm, intelligent, and sympathetic discipline during the years of childhood and youth. They also suggest that character as well as intelligence is in general an important factor in determining success, notwithstanding the fact that a few men and women of marked achievements have had serious character defects.

Further evidence of the importance of early training is afforded by a study reported in 1912 by E. E. Van Cleve.[1] In this case, not success but delinquency and failure formed the center of the investigation. Van Cleve found that the prison population in a number of states revealed some striking and thoroughly consistent correlations between the church affiliations of people and their relative freedom from serious crime. Just as Visher found wide variations among different occupational groups in the proportion of successful children that they produced, so Van Cleve found wide variations among religious denominations as to the proportion of their adherents that landed in prison. Certain denominations had very

[1] A brief summary of Van Cleve's study was published in *School and Home Education* for October, 1912. (Vol. XXXI, pp. 44 ff.)

high ratings with respect to the freedom of their adherents from serious crime; in comparison with these, other denominations fell very low. Again, the factor of selection undoubtedly operates; some denominations are largely limited to the better circumstanced and more cultured classes; others are universal in their appeal for members. This fact, however, was not a satisfactory explanation of Van Cleve's findings, for, while some "select" denominations stood very high, all of them did not; and while some of the universal churches stood low, others made a most creditable showing. After a prolonged study of all apparent factors involved, Van Cleve concluded that the most reasonable explanation of the wide differences was the relative emphasis that the several denominations placed both in doctrine and in practice upon *the care and training of children in the early years.*

The influence of the teacher. Insofar as the school exerts an influence upon the traits that Hartshorne and May studied, the personal influence of the teacher seems to be more significant than any particular subject matter of instruction. "On the whole, there is less cheating when . . . relations [between teacher and pupils] are free and cordial and there is a spirit of good will and coöperation." The beneficial influence of the teacher seems to express itself most effectively in the development of a wholesome tone or morale in the class. While there was in general less cheating in the schools operated on the progressive theories than on the "traditional" theories (see p. 306), some of the latter made as commendable a showing as the former, and in both cases, Hartshorne and May believe, it is the teacher who is primarily responsible for the good results.

The influence of companions and friends. The specifically social character of the *mores* is strongly evi-

denced by the fact that, insofar as cheating in school is concerned, children tend fairly closely to resemble their companions and friends in their tendencies either to yield to or to resist temptation.

The influence of organizations purporting to develop character traits. Hartshorne and May make the following statement regarding the effect of organizations offering recognition in the form of badges or buttons for good conduct: " Children [belonging to such organizations] deceive about the same as (and in one case more than) children who do not belong. Furthermore, in one organization length of membership and rank achieved were positively correlated with deceptiveness."

The influence of moral exhortation. Hartshorne and May have this to say about the effects of moral preachments: ". . . the mere urging of honest behavior by teachers or the discussion of standards and ideals of honesty, no matter how much such general ideas may be ' emotionalized,' has no necessary relation to the control of conduct. The extent to which individuals may be affected, either for better or for worse, is not known, but there seems to be evidence that such effects as may result are not generally good and are sometimes bad." They go on to say, however, " This does not imply that the teaching of general ideas, standards, and ideals is not desirable and necessary, but only that the prevailing ways of inculcating ideals probably do little good and may do some harm." On the other hand, Voelker, as we have seen, found that efforts to inculcate ideals of honesty by the methods employed in the Boy Scouts organization seemed to have a positive effect.

Intelligence and character. According to the Hartshorne-May findings there is a positive correlation of about 0.50 between honesty as measured by their tests of deception and intelligence as measured by standard mental tests. Again, "good things tend to go together." (See p. 134.) The increase in honesty as one goes up the intelligence scale is shown in the following graph:

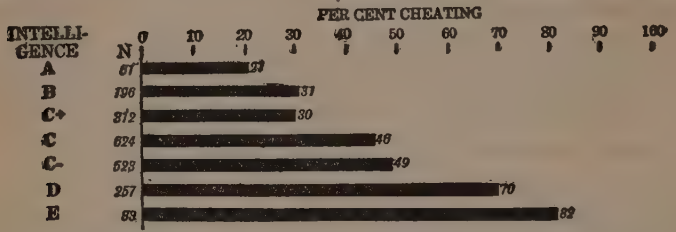

Fig. 17. Per cent cheating on Hartshorne and May school tests at each level of intelligence. (From Hartshorne and May, *Studies in Deceit*, Fig. 24.)

The relative specificity of the factors that control conduct. Both the objective studies and the more recent theoretical discussions lead strongly to the conclusion that what is ordinarily termed "character," far from being a general trait, is rather a sum total of specific tendencies to act. In its efforts to improve character, education can work with greatest certainty in fixing specific habits. It can work with less certainty but in many instances with proved success toward generalizing these specific responses and expanding their operation by making them the basis of dynamic ideals. The field within which even the most general of these ideals will actually operate to control conduct seems, in the light of our present knowledge, to be relatively narrow. There are, too, as Hartshorne and May very

clearly point out, marked inconsistencies among ideals that necessitate frequent adjustments in their application. One may instance the conflict that often arises between one's ideal of frank honesty and one's ideals of kindness, courtesy, loyalty to one's family, and to one's friends; or between one's ideal of patriotism and one's ideal of human brotherhood; or between one's ideal of thrift and one's ideals of generosity and charity. The situations to which such conflicts give rise constitute probably the most puzzling problems that confront people who wish to do right. Undoubtedly one reason why mere exhortation in behalf of moral ideals is often ineffective and sometimes bad lies in the fact that it ordinarily implies a counsel of perfection the obvious inconsistencies of which even a moderate intelligence can discern.

The problem of character education in American schools. In spite of the specificity of character traits, in spite of the restricted range within which ideals actually operate, and in spite of the conflicts that arise among ideals, the task of character education is far from hopeless. In discussing the effect of nurture upon intelligence (pp. 262 ff.), it was pointed out that small gains scarcely discernible in the individual may become of paramount significance when effected among vast masses of people. In a very notable way, the nations that have made elementary education universal have profited by the policy. Not only has universal enlightenment brought measurable economic benefits, but it has meant in all nations that have adopted it a larger measure of self-control upon the part of the people as a whole than previously prevailed, as indicated by their

almost complete freedom from violent revolutions. In practically all such nations, too, the development of the universal school has been paralleled by a gratifying decrease in crime, in intemperance, and in at least the grosser forms of immorality.

Unfortunately our own country is the outstanding exception to the last-named parallelism — that between the expansion of universal education and the decrease of crime. This is one reason for the very great concern of American education at the present time in the problems of character education. The appalling prevalence of serious crime in the United States as compared with other civilized nations, and the apparent increase in crime during a period when the crime ratios in most of the other enlightened nations have been steadily falling, constitute indeed an educational problem of the first magnitude. It should not be inferred, however, that our schools have not exerted a positive influence on the moral constants. There is an abundance of evidence that the influence of the school has been on the whole salutary and wholesome; but it is also clear that the school has not been powerful enough to counteract other forces which are and have been operating to loosen restraints and to intensify temptations. Among these forces one must include the unprecedented material prosperity of the American people and their very great mobility. The former has greatly increased leisure and provided the means of enjoying this leisure; it has also tempted men to acquire wealth by short-cut methods in which legal and moral distinctions are not always sharply drawn. The latter — the mobility of the population — has tended to break down the restraints

that go with a settled abode and to multiply temptations to play fast and loose with the moral constants. American education has consequently been laboring under a handicap that the schools of other countries have not had to meet in anything approaching the same measure.

There is every reason to believe that American education will be able to overcome this handicap. It is clear enough that neither pious wishes nor eloquent exhortations will avail. Nor are superficial programs based upon flabby sentiment likely to carry us very far in the right direction; as someone has said, you cannot cure a cancer by sprinkling it with rosewater. Even in its specific phases, character is something to be achieved by effort and sacrifice. Discipline in its true sense has by all odds the best claim for recognition as the fundamental key to character education.

Summary. — To possess a good moral character commonly means to behave according to the accepted standards of society. It would be better defined as the tendency to act in accordance with one's ideals of what is right. To teach pupils to do this is a very difficult as well as a most important undertaking of education. It is not enough to teach pupils to *know* right from wrong; they must have a clear-cut determination to *do* right rather than wrong. It is generally conceded that the character of a child is molded in the early years, hence the need for forming as many desirable habits as possible during early childhood, for these habits form an important concrete basis for the development of dynamic ideals. Often undesirable character traits are the result of strong instinctive tendencies or urges which come into conflict with the *mores* of the group.

The cure lies in the redirection of the native urges through control and guidance. Attempts are being made to measure character by means of objective tests. The following are some of the conclusions resulting from recent studies of character: (1) the influence of the home is probably the most important factor; (2) the influence of the teacher and of one's companions and friends is marked; (3) the general value of moral exhortation is extremely questionable, although under certain conditions it seems to have a positive effect; (4) there is a significant positive relationship between intelligence and desirable character traits; (5) among children, at least, character traits seem to be highly specific.

Definitions and Explanations of Terms Used

Personality traits. Mental dispositions or tendencies to act that are not identical with the intellectual traits measured by the intelligence tests. Personality traits are recognized in everyday language by such terms as enthusiasm, tact, sympathy, capacity for leadership, loyalty, dignity, and tolerance. Personality traits are particularly important in social relationships. All the personality traits just named and many others are significant components of what is often termed a " good teaching personality."

Character traits. A special group of personality traits intimately related to moral conduct and commonly spoken of as "virtues": honesty, cleanliness, chastity, temperance, thrift, charity, fidelity, and the like.

Moral character. A general term usually indicating that an individual tends to act in harmony with the

standards or *mores* of the group. A better meaning would be "a tendency to act in accordance with the individual's judgment of what is right."

Moral constants. The standards of conduct that have been found in the experience of the race to be essential to the safety, perpetuation, and progress of society. The term " constants " is relative; standards of conduct sometimes change. The change, however, is usually slow and dependent upon the gradual emergence of new forces and factors in social life.

Levels of conduct. Fairly definite steps or stages in the development of choice among various possibilities of conduct. The determination of conduct upon the basis of ideals of what is right and what is wrong is generally recognized as the highest level.

Ideals. Ideas (concepts, meanings) which have a peculiar directive force over conduct because of the feeling of worth that attaches to them; " master ideas."

Terminal ideals. Remote ends of conduct eagerly sought; ambitions; large life purposes.

Regulative ideals. Standards which hold conduct within certain limits while one strives to attain or realize terminal ideals. The " moral constants " when idealized are typical examples of regulative ideals.

Discipline. In general, the control of an individual's conduct and its guidance toward the formation of desired habits, meanings, and ideals. Discipline may be external, as when the control and guidance are effected by parents, teachers, or other persons, or by the pressure of social forces, such as the *mores* of the group; or internal, as when the control and guidance are effected by the individual himself. The latter

condition — *self*-discipline — is one of the ends which external discipline should seek.

The "Progressive" school of educational theory. Those who emphasize in the process of education a minimum of external discipline and the development of desired habits, meanings, and ideals upon the basis of the learner's interests and purposes. Most of the Progressive doctrines have been advocated for several hundred years; hence the term "Progressive" does not imply novelty.

The "Stalwart" ("Traditionalist") school of educational theory. Those who emphasize the importance of external control and guidance during the early years of life as a necessary means of developing desirable habits, meanings, and ideals, and as the most effective method of developing the capacity for self-discipline; and who also emphasize the importance of systematic and persistent effort, utilizing wherever possible the learner's interests and purposes, but not depending upon the spontaneous appearance of such interests and purposes.

Objective tests of character traits. Tests constructed on the pattern of the intelligence and achievement tests and designed to measure in quantitative terms the strength of tendencies to right conduct. The tests so far developed place the persons tested in situations where they may make a choice between honest and dishonest acts.

The relative specificity of moral conduct. A phrase indicating that the controls of conduct tend to be highly specific. While some measure of generalization is effected through the development of ideals, the field

in which ideals operate is restricted. Such terms as "character" and "virtue" should be regarded as relative and not absolute.

QUESTIONS AND EXERCISES

1. Distinguish between intellectual traits and personality traits; between personality traits and character traits.

2. Symonds has pointed out that a person who has an interesting personality may not have a good character. Can you find illustrations from history, literature, or everyday life?

3. Recall from your knowledge of history outstanding changes in the *mores* or group standards of a people. (For example, the changed attitude toward slavery, polygamy, the duel.) Can you note in present-day civilization any tendencies toward the transformation of fundamental *mores?*

4. Reflect and report the results of your reflections on the statement that the moral constants have been developed and have persisted because they have been essential to social welfare and progress.

5. Estimate in your own experience the relative frequency with which your conduct has been governed by: (1) fear of pain or hope of reward; (2) fear of personal disapproval or blame or hope of personal approval or praise; (3) fear of the censure or hope of the plaudits of the group; (4) your own ideals of right and wrong.

6. Distinguish between ideas (concepts, meanings) and ideals; between terminal and regulative ideals. Can you find in your own experience examples of these several types of controls? To what extent are they actually controls of conduct?

7. What is meant by discipline? Distinguish between external discipline and self-discipline. In your own experience has external discipline promoted or retarded self-discipline?

8. List some of the important doctrines of the Progressive school of educational theory. What is the opposing school usually called? What is the significance of the term "Stalwart" proposed in this chapter as a name for this opposing school? (It would be interesting and instructive to have a class debate based on the doctrines of these two schools.)

9. Can you think of reasons that will explain why the development of tests for character-traits lagged many years behind the development of tests for intellectual traits? Describe the general technique used in constructing tests for honesty.

10. Discuss the provisional hypotheses that are based on the findings of the character-investigations and on the implications of educational and psychological theory (pp. 309–315).

11. Give as many reasons as you can find or think of which may help to explain the fact that serious crime is more prevalent in the United States than in other enlightened nations. Try to suggest steps that education may possibly take to correct this condition.

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INDEX

(Numerals in italics refer to brief footnote statements regarding outstanding psychologists.)

Ability, learning, and age, 136
Accomplishment quotient (ratio), cause of variation in, 269; computation of, 267 f.; definition of, 267, 274; illustration of, 266 ff.; relation to intelligence, 268 f.; significance of, 268 f.
Accuracy, rapidity *vs.*, 134
Achievement age, 267 f.
Achievement tests, 267
Active attention, 47; definition of, 57; illustration of, 50 f.; principle of, 50 f.
Adaptive tendencies, illustrations of, 103 ff.; value of, 103 ff.
Adaptive tendency, construction as, 105; curiosity as, 103 f.; play as, 104
Adjustment, consciousness and, 13, 16 f.; definition of, 16
Afferent nerves, function of, 88
Age, and fatigue, 279; mental, 259 f., 278
Aids, objective, 149
Alcohol, effect on efficiency, 286 f.
Anatomical differences, illustrations of, 252
ANGELL, J. R., 89
Animals, learning among, 21 ff.
Annoyers, 297 f.
Apperception, 149; basis of, 163; definition of, 164
Apperceptive bases, habitual attitudes as, 149 f.
Areas, cortical, 92
Arithmetic age, illustration of, 267 f.
Army tests, results of, 263 f.
Assignment of lessons, 216
Associating neurones, 85 f.; definition of, 97
Association, defined, 181; laws of, 181; relation to recall, 170; relation to recollection, 170; rôle of, 176 ff.; sensory resemblances and, 177; and meaning, 177 ff.
Attention, active, 47; adaptability of, 200; and consciousness, 6 f.; a selective agent, 45; association and, 55; behavior and, 55 f.; behavior related to, 43 ff.; consciousness and, 43; consciousness related to, 45; definition of, 44 f., 57; fatigue and, 53; feeling and, 73 f.; fluctuation of, 58; how to secure sustained, 52 f.; illustrations of, 45 ff.; intelligence and, 56; interest and, 51; involuntary,

Attention — *Continued*
46; kinds of, 46 f., 51; laws of, 47 ff.; passive, 46; primary passive, 47 f., 206; principle of active, 50 f.; readiness and, 44; relation of interest to, 44; relation to learning, 193 f.; relation of purpose to, 51; secondary passive, 51 f.; significance of primary passive, 48 f.; span of, 55; summary of, 56 f.; variety an aid in, 52 f.
Attentive repetition, 127 ff.; definition of, 138
Attitudes, conceptual, 210 f., 218; emotional, 78; habit and, 130 f.; perceptual, 210 f.
Auditory sensations, 143
Autonomic nervous system, 88, 97; functions of, 94 f.
Axon, 85; definition of, 96.

Barker, L. F., 87
Behavior, and attention, 43 ff., 55 f.; blocking of, 203 f.; consciousness related to, 13; control of by mind, 2; economy of conceptual, 211 f.; effort and, 43 ff.; emotion and, 61 ff., 69; examples of reflexive, 83; feelings and, 61 ff.; illustrations of, 17; illustrations of reflexive, 99 f.; intelligent, 25 f.; interest and, 43 ff.; learning and, 20 ff.; meanings the result of, 147 f.; modification of, 21 ff.; native, 100 ff.; nervous system and, 82 ff.; patterns of, 211; perception and, 151 f.; problem cases of, 302 ff.; reflex, 99 f.; relation to meaning, 203 ff.; relation to thought, 203 ff.; significance of spontaneous, 30 f.; simplest type of, 82; spontaneous, 30 ff.; structures controlling complex, 83 f.; summary of, 27 f.
Bell, A. G., 223
Binet, A., *255*, 256, 258
Burks, B., 265, 266
Brain, parts of, 88 f.

Caffeine, effects of, 285 f.
Cajal, R., 87
Calkins, M. W., 152
Cattell, J. M., 142
Cell body, 85; definition of, 96
Cells, functions of specialized, 83
Central nervous system, 88 f.; description of, 88 f.; functions of, 90 ff.
Central tendency, 236 ff.; definition of, 247
Cerebellum, 89
Cerebral cortex, definition of, 97; areas of, 92
Cerebrum, description of, 89; white matter of, 92
Character, 292 ff.; conclusions of recent studies in, 318; definition of moral, 318 f.; discipline and, 304 ff.; early home training and, 305; habit and, 305; influence of companions on, 312 f.; intelligence and, 314; moral exhortation and, 313; relation of instinctive urges to, 301 ff.; meaning of moral, 270 f.; summary of, 317 f.; measurement, by Woodworth, 253

Character education, American school problems of, 315 ff.; discipline and, 317
Character traits, definition of, 318; development of, 295 ff.; influence of organizations on, 313 f.; measurement of, 307 ff.; objective tests, definition of, 320
Children, fatigue among, 279
Collecting, 104; value of, 104
Companions, influence of, 312 f.
Competition, 106 f.
Conception, consciousness and, 11 ff.
Concepts, illustration of, 11; definition of, 225; importance of, 217 f.; relation of ideals to, 299; rule for building, 218 f.
Conditioned responses, 117
Conditioning, process of, 120
Conduct, deceptive, 308 ff.; levels of, 296 ff.; moral, 302; relative specificity of moral, 320; specificity of factors influencing, 314 f.
Conduction, preferred paths of, 87 f., 96
Connecting neurones, 85 f.
Conscious activities, illustrations of, 3 ff.
Consciousness, adjustment and, 13; and attention, 6 f.; and feeling, 6 f.; and interest, 6 f.; and purpose, 4; association and, 11; behavior and, 13; conception and, 11 ff.; description of, 17; feeling, an element of, 62 f.; feelings and, 61 f.; function of, 2; imagination and, 10; judgment and, 11 ff.; meaning and, 9 f.; memory and, 11; perception and, 9 f.; purpose of, 13, 20; reasoning and, 11 ff., 14 f.; sensation related to, 9 f.; summary of, 15 f.; synonymous with mind, 1
Constants, moral, definition of, 319
Constructiveness, 105; value of, 108
Cord, functions of spinal, 90 f.
Correlation, coefficient of, 239 f.; definition of, 248; illustrations of, 238 ff.; meaning of, 238 f.; negative, 239 f.; positive, 238 ff.; reliability of *r*, 241; zero, 240
Cortex, areas of the, 92; consciousness and, 92 f.; description of, 92
Courtis, S. A., *267*
Crime, as an educational problem, 316 f.
Curiosity, definition of, 38, 41; illustration of, 39; learning and, 38 ff.; the adaptive tendency of, 103 f.; value of, 103 f., 39 f., 108
Curve, normal, 234 f.; of forgetting, definition of, 247
Curves, characteristics of normal, 234; concave, 230; convex, 230; of distribution, 234 ff.; skewed, 234 f.

Darwin, C., 239
Dearborn, W. F., *257*
Deduction, 212 f.
Defects, significance of sensory, 146 f.

Dendrite, definition of, 96; function of, 85
Dermal sensations, 144 f.
Devices, value of, 128
Dewey, J., 77
Diagram, scatter, 238 f.
Difficulty, as condition of thinking, 204 f.
Discipline, explanation of, 319; significance of, 305; formal, 195 ff., 221 ff.
Distribution curve, definition of, 247
Distributions, significances of, 235 ff.; skewed, 234 f.
Doctrine of natural punishments, 121
Downey, J., 253
Drill, importance of, 128 f.
Drive, definition of, 121
Duty, ideal of, 119

Ebbinghaus, H., 255
Economy of learning, 184 ff., 289; through distributed practice, 187 f.; whole *vs.* part method, 184 ff., 188; rate, 194; summary, 198 f.
Education, possibilities and limitations of, 269 ff.
Educational age, use of, 267 f.
Educational theory, Progressive school of, 320; Stalwart school of, 320
Education, character, 304 ff.; limitation of formal, 269 ff.; possibilities of formal, 269 ff.; significance of universal, 271 f.
Effect, law of, 128
Efferent nerves, function of, 88
Efficiency, 283 ff.; alcohol and, 286 f.; caffeine and, 285 f.; climate and, 288 f.; conditions of, 54 f.; effects of distraction on, 289; effects of emotion on, 289; feeling and humidity and, 288 f.; incentives and, 283 f.; increase of, 289; interest related to, 283; knowledge of progress and, 284 f.; methods of work and, 289; see fatigue; summary of, 290; temperature and, 288 f.; time of day and, 287 f.; tobacco and, 286; ventilation and, 288 f.
Effort, importance of, 133 f.; interest and, 43 ff.; value of, 113, 268
Emergency theory of emotions, 68 f.
Emotion, 65 ff.; behavior and, 61 ff., 69; causes of, 71 f., 203 f.; characteristics of, 66 f.; conditions of, 69; control of, 203 f.; emergency theory of, 68 f.; illustrations of, 70 ff.; imagination and, 71 f.; James-Lange theory of, 76 f.; relation of action to, 69 f.; relation of thought to, 69 f.; theories of, 67 ff.; urges related to, 66
Emotional stability, cases of, 253
End-brush, definition of, 96; function of, 85
Environment, definition of, 273; effect on individual differences, 251 f.; *vs.* heredity, 251 f.; improvement of, 252; influence of home, 269; influence on I. Q., 266; meaning of, 251 f.

Error, probable, 240 f.
Examination, completion, 243 f.; true-false, 242 f.; multiple-choice, 244 f.; characteristics of new-type, 241 ff.; essay-type, 241 f.; matching or pairing, 245 f.; objective, 241 ff.; scoring of true-false, 242 f.; short-answer, 241 ff.
Exceptions, allow no, 129 f.
Exercise, law of, 128
Experience, apperception, the result of, 149 f.; and behavior, 2; definition of, 17; habit the result of, 124; memory of, 180; organization of, 178 f.; sensation basic to, 10

Facilitation, 100; definition of, 97; principle of, 94
Facts, organization of, 216
False perception, illustration of, 152; and imagination, 156
Fatigue, age and, 279; among school children, 279; attention and, 53; cause of, 277; cause of plateaus, 233; change of work and, 282 f.; definition of mental, 58, 277; elimination of, 277; health and, 280; individual differences and, 280; interest and, 283 f.; lighting and, 280 f.; mental, 278 f.; nature of, 276 f.; physical, 277; points of view concerning, 278 f.; recovery from, 281 ff.; resistance to, 280 ff.; rest and, 282 f.; sex and, 280; sleep and, 282 f.; summary of, 289 f.; type of work and, 281
Feeling, attention and, 73 f.; behavior and, 61 ff.; complex forms of, 65 ff.; and consciousness, 6 f.; efficiency and, 63 f.; an element of consciousness, 62 f.; habit and, 125 f.; illustrations of, 61 f.; nature of, 61 f.; principle regarding, 64; summary of, 77 f.; teaching affected by, 76 f.
Feelings, consciousness and the, 61 f.; function of, 62 f.
Fighting, instinctive tendency of, 105
Focalization, principle of, 127; definition of, 128
Forgetting, curve of, 233 f.; law of, 191; of meaningful and meaningless material, 191; measurement of, 233 f.; rate of, 191, 233
Formal discipline, 195 ff., 221 ff.
Free ideas, definition of, 28
Freeman, F. N., *265*, 266
Frequency, law of, 174 ff., 181; curve of, 234 f.
Freud, S., 303
Fulton, R., 223

Galton, F., *239*
Games, illustrations of, 37 f.; learning through, 37 f.
Geniuses, 266
Goddard, H. H., 258
Gregariousness, 107 f.
Groos, K., 32, 104
Gustatory sensations, 143 f.

Habit, 124 ff.; and consciousness, 7 f.; definition of, 138; experience and, 124; feeling

Habit — *Continued*
and, 125 f.; instinct contrasted with, 124 f.; limitations of, 125 f.; plateaus in habit formation, 231 ff.; pleasure accompanies, 75; specificity of, 197 f.
Habit formation, accuracy and speed in, 134; attitudes and, 130 f.; importance of, 126; importance of teaching, 136; a rule for, 126 f.; summary of, 137 f.
Habits, illustrations of, 14; relation to ideals, 301; specific character of, 134 f.; spread of, 195 f.
Habitual tendencies, 7
HALL, G. S., *33*, 34
Hallucinations, 153 f.; definition of, 164; illusions *vs.*, 153 f.; illustrations of, 154; as symptoms of mental disease, 156 f.
HARTSHORNE, H., 308, 309, 312, 313, 314
HAYWARD, F. H., 171, 174
Health, a factor in fatigue, 280
Hemispheres, cerebral, 89
Heredity, results of, 251 f.; *vs.* environment, 251 f.
Hoarding, 104; value of, 104
Hypothesis, value and dangers of, 219 f.; tentative, 225 f.

Ideals, definition of, 121, 319; regulative and terminal, 298 f., 319; development of, 299 f.; instincts and, 118 f.; nature of, 298 f.; relation of habits to, 301; transfer of, 196 ff.
Ideas, definition of free, 28; general, 207; learning through free, 24 ff.; relation of ideals to, 118 f., 299; relation of meanings to, 299; specificity of, 300
Idiot, 262, 266
Illusion, definition of, 164; 153 ff.; classification of, 154 f.; hallucinations *vs.*, 153 f.; illustrations of, 152 ff.; suggestion and, 155
Illustrations, 149; objective, 219; selection and use of, 218 f.
Imagination, behavior and, 160; children's, 160 ff.; consciousness and, 10; dangers of, 162 f.; definition of, 157 f., 164; kinds of, 158 f., 165; perception contrasted with, 157; reproductive, 158 f.; as the result of experience, 159; summary of, 163 f.; value of, 159 f.
Imbecile, 262, 266
Impression, defined, 181; relation to retention, 170
Impressions, establishment of, 190
Incentives, effects of, 283 f.
Individual differences, 250 ff.; causes of, 251 f.; as due to race, 254; fatigue and, 280; in character, 253 f.; in intelligence, 255 ff.; mental, 251 f.; nationality and, 254; nature of, 250 f.; physical, 251 f.; provisions for, 272; sex, 254; summary of, 272 f.; temperamental, 252 f.; with respect to meanings, 148 f.

Individualistic tendency, parental, 105 f.; self-assertion as an, 105; sex behavior as an, 105 f.
Induction, 212 f.
Inheritance, results of, 251 f.
Inhibition, 303; annoyance and, 75 f.; definition of, 97; value of, 109
Innate, definition of, 121
Innate urges, 102
Instinct, 100 ff.; habit contrasted with, 124; controversy concerning, 102 f.
Instincts, human *vs.* animal, 101 f.
Instinctive activities, and reflexes, 100 f.
Instinctive tendencies, 7; adaptive, 103 ff.; classification of, 103; definition of, 100, 101; collecting and hoarding, 104 f.; constructiveness, 105; curiosity, 103 f.; definition of, 121; education based on, 108; fighting, 105; gregariousness, 107 f.; parental, 105 f.; play, 104; rivalry, 106 f.; self-assertion, 105; sex behavior, 105 f.; social behavior, 106 ff.; feeling related to, 120; inhibition of, 75 f.; modification of, 108 ff.; relation to ideals, 301 ff.; summary of, 119 f.
Intelligence, measurement of, 255 f.; cause of differences in, 255; character and, 314 f.; definition of general, 273; differences due to nationality, 254; levels of, 262; measurement of, 255 f.; normal, 262; of races, 254; of soldiers, 263 f.; race differences in, 264; relation to accomplishment, 268 f.; relation to conceptual thinking, 261; relation to schooling, 269 f.; sex differences in, 254; subnormal and supernormal, 260, 262; variability within same age, 255
Intelligence quotient, 260 ff.; computation of, 260 f.; constancy of, 262 ff.; definition of, 274; of adopted children, 265 f.; relation of school attendance to, 270; significance of, 261 f.
Intelligence tests, Army, 257; Goddard revision, 258 f.; group, 257; individual, 257; kinds of, 256 ff.; non-verbal, 257; performance, 257; verbal, 257 f.
Intelligent behavior, illustration of, 26 f.
Interest, and consciousness, 6 f.; attention and, 43 ff.; definition of, 58; relation of fatigue to, 283; of pupils, 214 ff.
Interference, causes of, in learning, 189 f.; phenomenon of, 132 f.; relation to closeness of periods, 190; relation to association, 190; type of material, 190
Introspection, definition of, 270
Investigation, psychological, 270 f.
Involuntary attention, 46

James-Lange theory, 67 f.
James, William, *67*
Judd, C. H., 142, *196*

Judgment, 211 f.; consciousness and, 11 ff.; definition of, 211, 225; delayed, 212; function of, 211; illustration of, 11

Kinaesthetic sensations, 145
KITSON, H. C., 284 f.
Known, relating unknown to the, 150

LANGE, C., 67
Law, definition of, 226; of effect, 128; of exercise, 128; of readiness, 132; of use, 87, 128; of attention, 47 ff.
Learning, age and, 136; as doing, 147; behavior and, 20 ff.; on conceptual level, 271; connection with conduct, 192; curiosity aids, 38 ff.; curves of, 229 ff.; definition of, 28; distributed practice, 187 f.; economy of, 194 f.; plays and games aid, 37 f.; pleasantness and unpleasantness in, 112 f.; rate of, 194, 229 ff.; rote, 191 f.; significance of, 21; synapse related to, 86; trial and error, 22 ff.; "warming up," 193 f.; with intent to remember, 179 f., 188
Learning curve, definition of, 247
Learning periods, best length of, 187 f.
Lessons, assignment of, 216
Levels of conduct, explanation of, 319
Lighting, fatigue and, 280 f.

Material, illustrative, 149
MAY, M. A., 308, 309, 312, 313, 314
McDOUGALL, W., *115*, 296
Mean, 236 f.
Meaning, attached to qualities, 209; determined by behavior, 207 f.; place in consciousness, 206 f.; related to behavior, 203 ff.; related to memory, 199; consciousness and, 9 f.
Meanings, behavior and, 147 f.; development of, 216 f.; explanation of, 224 f.; individual quality of, 148 f.; through association, 177 ff.; use of, 179
Measurement, of character, 253 f., 307 ff.; of intelligence, 255 ff.; objective, 270; subjective, 270; summary of, 246 f.
Median, 236 f.
Medulla, 88
Memory, consciousness and, 11; definition of, 180; for meaningless material, 191 f.; for poetry, 184 f.; improvement of, 193; through association, 191 f.; of meaningful material, 191 f.; mnemonic devices, 192 f.; relation to imagination, 172 f.; rote, 191 f.; summary of, 180; wider use of term, 270
Mental age, explanation of, 273; significance of, 260; use of, 267 f.
Mental fatigue, causes of, 278; definition of, 58; nature of, 278 f.
Mental image, 157
Method, project, 131, 215; transfer of, 196 ff.; whole *vs.* part, 184 ff., 187
Methods, mnemonic, 200

Meumann, E., *184*
Mind, synonymous with consciousness, 1
Mnemonic devices as aid to memory, 192 f.
Mode, 236
Mood, 72 f.; explanation of, 78; causes of, 73
Moral character, definition of, 318 f.
Moral conduct, relative specificity of, 320
Moral constants, 293 f., 298; definition of, 319
Moral instruction, value of, 300 f.
Moral training, significance of the unpleasant, 110 f.
Mores, 72 f.; character traits and, 317; definition of, 292 f.; specificity of, 312 f.; explanation of, 78 f.; regard for, 150; value of, 306
Moron, 262, 264
Morse, S. F. B., 223
Motivation, 215 f.; definition of, 138; use of, 130 ff.
Motive, definition of, 58; intrinsic, 130 f.; relation to interests, 131 f.
Motor neurones, 85 f.; definition of, 97
Motor sensations, 145
Movement, and consciousness, 2; of consciousness, 5; of ideas in thinking, 205 f.
Muscular sensations, 145

Native reactions, 100 ff.
Natural punishments, doctrine of, 111 f.
Nature, *vs.* nurture, 264 ff., 310 ff.
Nerves, afferent, 88; cranial, 91 f.; efferent, 88
Nervous stability, causes of, 253
Nervous system, 81 ff.; autonomic, 88, 97; behavior controlled by, 82 ff.; central, 88 f.; comparison with telephone system, 84 f.; complexity of the, 89; description of central, 88 f.; divisions of, 88 f.; function of, 84; functions of the autonomic, 91 f.; functions of central, 90; functions of the sympathetic, 94 f.; peripheral, 88; the simplest form of, 83 ff.; summary of, 95 f.; sympathetic, 88
Neurone, 85 ff.; associating, 85 f., 95, 97; connecting, 85 f.; definition of, 96; function of, 85 f.; motor, 85 f., 95; sensory, 85, 95; number of, 96; parts of, 85
New-type tests, advantages and disadvantages of, 246 f.
Norms, development of, 229
Nurture, influence on I.Q. of, 266; *vs.* nature, 310 ff.

Objective aids, 149
Objective tests, definition of, 248; of intelligence, 255 ff.; of achievement, 267; of character, 320
Objects, defined according to qualities, 207 f.; meaning of, 207
Olfactory sensations, 144
Organic sensations, 145 f.
Organism, definition of, 16
Organization of facts, 222

Outcomes, importance of pleasurable, 74 f.
Overlearning, 198; principle of, 191

Part method, explanation of, 199
Parental tendency, 105 f.
Passive attention, 46 f.
Pasteur, L., 223
Perception, 140 ff.; apperception and, 149 f.; behavior and, 151 f.; consciousness and, 9 f.; definition of, 140, 164; definition of true, 153; false, 164; sensation and, 140 f.; summary of, 163 f.; true and false, 150 ff.
Peripheral nervous system, 88
Personality traits, definition of, 318
Pictures, use of, 174, 219
Pillsbury, W. B., 93
Physiological differences, effect of environment on, 252; illustrations of, 252
Plateau, definition of, 247; causes of, 231 f.; removal of, 232 f.
Play, 31 ff.; as adaptive tendency, 104; definition of, 31; explanation of, 32 ff., 41; Groos's theory of, 32 f.; Hall's theory of, 33 ff.; illustrations of, 31; limitations as an educative agency, 35 f.; relation of attitude toward, 31; stimulating learning through, 37 f.; theories of, 32 ff.; value of, 32 ff., 35, 104, 108; work *vs.*, 31
Practice, distribution of, 187 f., 199
Preferred paths, 87 f.; definition of, 96
Primacy, law of, 170 ff.; statement of law, 181
Primary passive attention, conditions of, 48; definition of, 57 f.; significance of, 48 f.
Probable error, definition of, 248; of *r*, 241; significance of, 241; size of, 241
Problem, as condition of thinking, 14 f., 204 f.
Productive imagination, 158 f.
Program, of school, 287 f.
Progressive school, 306; definition of, 320
Project method, 131, 215
Psychology, definition of, 1; problem of, 15
Punishment, Spencer's doctrine of, 306
Purpose, and consciousness, 4; function of, 204; definition of, 17

Range, computation of, 236
Rapidity, accuracy *vs.*, 134
Reading age, illustration of, 267
Readiness, attention and, 44; law of, 132
Reasoning, consciousness and, 11 ff., 14 f.; deductive, 212 ff., 225; definition of, 225; inductive, 212 ff., 225; steps in, 213 f.; training in, 221 f.
Recall, definition of, 181, 199; description of, 169; importance of, 188
Recency, application of law, 172; law of, 170 ff.; statement of law, 181

Recitation, value of, 181
Recognition, description of, 169; explanation of, 181
Recollection, description of, 168 f.; explanation of, 181
Red-letter lessons, 174
Reflex, 99 f.
Reflex activity, definition of, 121
Reflexes, illustrations of, 83, 99 f.
Reflex movements, 7
Regulative ideals, definition of, 319
Repetition, attentive, 127 ff.; definition of attentive, 138; law of, 174 ff.
Repression, 303
Reproductive imagination, 158 f.
Resistance, pathways determined by, 87 f.
Responses, motor, 217
Retention, definition of, 180
Reviews, value of, 189
Rivalry, efficiency and, 285; the instinctive tendency of, 106 f.

Satisfiers, 297 f.
Schooling, relation to intelligence, 269 f.
Secondary passive attention, 51 f.; definition of, 57 f.; illustration of, 51 f.
Self-assertion, 105
Sensation, consciousness related to, 9 f.; definition of, 141 f., 164; experience related to, 10; perception and, 140 f.; response completes, 86
Sensations, auditory, 143; classification of, 142 ff.; dermal, 144 f.; gustatory, 143 f.; kinaesthetic (motor), 145; muscular, 145; olfactory, 144; organic, 145 f.; visual, 143
Sensori-motor, experience called, 146
Sensory defects, significance of, 146 f.
Sensory neurones, 85 f., 95; definition of, 97
Sex, fatigue and, 280; instinct, 105 f.
Simon, T., 255, 256, 258
Situation, explanation of, 17
Skewness, causes of, 234 f.; left, 234 f.; right, 235
Skill, definition of, 138
Sleep, relation to fatigue, 282 f.
Social tendencies, 106 ff.; gregariousness, 107 f.; rivalry, 106 f.
Speed, accuracy *vs.*, 134
Spelling age, illustration of, 267
Spencer, H., 111, 306
Spinal cord, 88 f.; effects of injuries to, 90; functions of, 90 f.
Stability, emotional, 253; nervous, 253
Stalwarts *vs.* Progressives, 306, 320
Standards, development of, 229; moral, 293, 298; social, 293 f., 298
Starch, D., *267*
Steffens, L., 184
Stephenson, G., 223
Study, how to, 179
Sublimation of instinctive tendencies, 115, 303
Sustained attention, how to secure, 52 f.
Symbols, development of, 209

Sympathetic nervous system, 88; function of, 94 f.
Synapse, definition of, 86, 96 f.; importance of the, 85; theories relating to, 86 f.

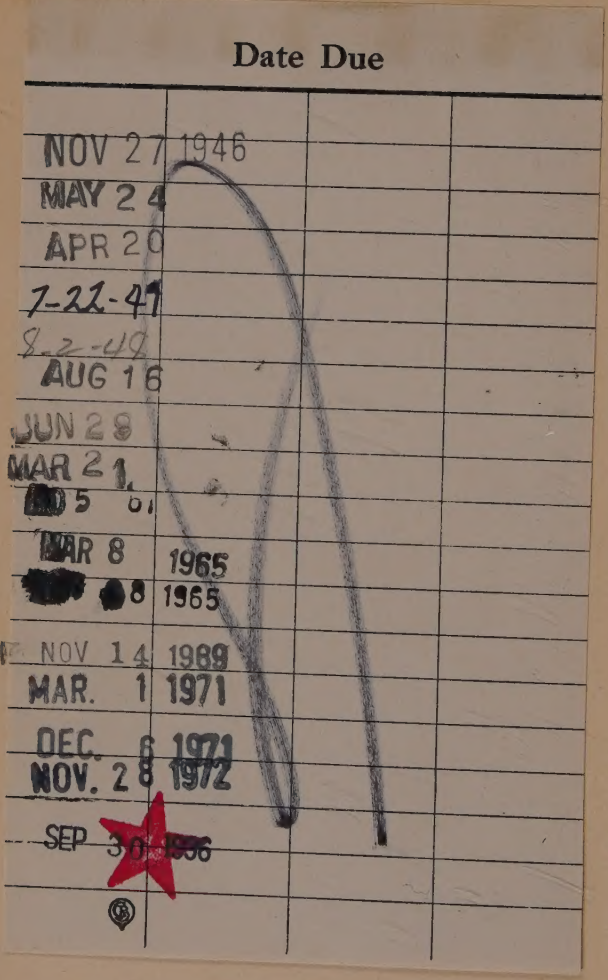
Temperament, individual differences in, 252 f.
Tendencies, need for checking immediate, 36; instinctive, 7, 100 ff.
TERMAN, L. M., *260*, 265
Terminal ideals, 319
Tests, of intelligence, 255 ff.; of achievement, 267; of character, 320
Theory, emergency, 68 f.; James-Lange, 67 f.; Progessive educational, 320; Stalwart educational, 320
Thinking, conceptual, 261; definition of, 224; steps in, 213 f.; summary of, 223 f.; training in, 221 ff.; use of past experience in, 205 f.; value of symbolic, 210
THORNDIKE, E. L., *25*
Thought, the complete act of, 213 f.; crisis, 203 f.; emotion and, 69 f.; relation to behavior, 203 ff.
TITCHENER, E. B., *46*, 142, 152
Training, significance of early home, 309 f.
Transfer, 195 ff.; in learning, 184 ff.; of method, 196 ff.; through ideals, 196 ff.; through identical elements, 195 f.
Trial and error, explanation of, 28; learning through, 22 ff.
True perception, 153

Urges, classification of native, 103; definition of, 121; illustration of, 14; native, 102 ff.
Use, law of, 87, 128

VAN CLEVE, E. E., 311, 312
VISHER, S. S., 310, 311
Visual aids, 219
Visual sensations, 143
Vividness, application of principles, 174; law of, 181
VOELKER, P. F., 307, 308, 313

Warming-up process, 53 f., 193 f.
WASHBURN, M. F., 22, 25
WATSON, J. B., *117*
WATT, J., 223
WHIPPLE, G. M., 179
Whole method, explanation of, 199
WOODWORTH, R. S., *253*
Work, definition of, 41; relation to fatigue, 281
WRIGHT, O. and W., 223
WUNDT, W., 149, 152, 153

YERKES, R. L., 22, 257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